

UNIVERSITY OF WASHINGTON DEPARTMENT OF OCEANOGRAPHY

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Technical Report No. 134

PHYSICAL, CHEMICAL, AND BIOLOGICAL DATA
FROM THE NORTHEAST PACIFIC OCEAN:
COLUMBIA RIVER EFFLUENT AREA, JANUARY-JUNE 1963

Volume II

CNAV Oshawa Cruise Oshawa-1: 12-26 March
Brown Bear Cruise 320: 28 March-10 April

Prepared by
C. M. LOVE
With the Data Analysis Staff

Scientific Program
Under the general direction of
Clifford A. Barnes

U.S. Atomic Energy Commission
Contract No. AT(45-1)-1725
RLO-1725-33

Office of Naval Research
Contracts Nonr-477(10)
and Nonr-477(37)
Project NR 083 012

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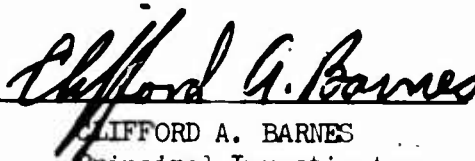
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Reference M65-56
March 1966



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INTRODUCTION

This report constitutes Volume II of Technical Report No. 134 and contains data from Cruise Oshawa-1, 12-26 March 1963, and Brown Bear Cruise 320, 28 March - 10 April 1963. A discussion of the objectives of these cruises and the scientific program of which they were a part will be found in Volume I, together with descriptions of the observations made, the methods of collecting samples and the methods of determination of properties. A list of the personnel engaged in collecting and preparing the data and a bibliography will also be found in Volume I.

The cruise tracks and station locations for cruises Oshawa-1 and Brown Bear 320 will be found in Figures 1 and 2 of this volume.

EXPLANATION OF DATA TABLES

The information in the data tables was transcribed directly from IBM cards using an IBM 1401 Data Processing System. A blank space in the tables or headings indicates that no observation was taken. The original data and the interpolated and computed values punched on the cards are in most cases recorded or coded in accordance with the procedures used by the National Oceanographic Data Center; however, some weather information is coded with U.S. Navy Hydrographic Office codes. The codes used to describe weather and sea conditions, etc., will be found in NODC Publication M-2 (National Oceanographic Data Center, 1964) or in H.O. Publication No. 606-c (U.S. Navy Hydrographic Office, 1956) and H.O. Publication No. 607 (U.S. Navy Hydrographic Office, 1955a). (See References in Volume I.) Some changes were made in the card format, but these do not affect the arrangement of the data in this report. Abbreviations and column headings are described below and, where necessary, the NODC or Hydrographic Office numerical codes have been reproduced to aid in interpreting the data.

Abbreviations and Headings Used in Data Tables

DATE	For Observed Values the date given is Greenwich day/month/year. For Biological Data the date given is local (ship's time, +8 zone) day/month/year.
HR (Hour)	Greenwich mean time to the nearest tenth of an hour of the messenger drop on the first cast.
LAT (Latitude and LONG (Longitude)	In degrees and minutes; or in degrees, minutes, and tenths of minutes on some stations.

SNDG (Depth of water)	Depth of water in meters at the station as determined by the ship's echo sounder. This depth was generally recorded immediately after the ship arrived on station.
WEA (Weather)	State of the weather. One of two possible codes was used for reporting present weather. A two-digit number in this space indicates use of WMO Code 4677, shown on page 9 ; one number preceded by an X indicates use of WMO Code 4501, shown on page 11. The X has no significance except to indicate which code was used.
WIND VEL DIR (Wind velocity and direction)	Wind velocity in knots. Wind direction, see code, page 8 .
BAROM (Barometric pressure)	To obtain the barometric pressure in millibars, add 900 if this number is above 50; add 1000 if below 50.
TEMP DRY WET (Air temperature, dry, wet bulb)	In degrees Celsius
RELHU (Relative Humidity)	Expressed in per cent.
WTRCLR (Water color)	Expressed according to the Forel-Ule scale. See code, page 10.
SECD1 (Water transparency)	Depth in meters to which a 12-inch (30.5 cm) Secchi disk could be seen on daylight stations.
SEA DIR (Sea state and direction)	State of the sea, see code, page 8 . Direction from which sea was coming, see code, page 8 .
SWELL DIR (Swell amount and direction)	Height and wave length of swell, see code, page 8 . Direction from which swell was coming, see code, page 8 .
DOM WAVE DIR HT PER (Dominant wave direction, height, and period)	Dominant wave characteristics (National Oceanographic Data Center, 1964) were reported on some cruises instead of sea and swell. Direction from which waves were coming, see code, page 8 . Height of waves, see code, page 8 . Period of waves, see code, page 11.

CLOUD TYPE <u> </u> AMT <u> </u> (Cloud type and amount)	Cloud type, see code, page 7 . Amount of cloud cover, see code, page 7 .
VIS (Visibility)	Range of visibility. See code, page 7 .
WIRE ANGLE(S)	In degrees. Wire angles are tabulated only for those casts whose numbers appear in the "Cast" column at the left of the page, i.e., casts from which data were obtained. The first number is the wire angle for Cast 1, or the lowest numbered cast appearing, the <u>second</u> for Cast 2, etc. Dashes (- -) indicate the wire angle was not recorded for that cast.
CST (Cast)	Cast number.
DEPTH	Depth in meters from which sample was obtained.
TEMP (Temperature)	In degrees Celsius.
SAL (Salinity)	In parts per thousand (‰).
SIGMA-T (σ_t)	An expression for the density of sea water at atmospheric pressure, having the indicated temperature and salinity. To convert sigma-t values to density, divide by 1000 and add 1; thus sigma-t 22.42 = density 1.02242.
OXYGEN (Dissolved Oxygen)	
ML/L	In milliliters per liter
MGA/L	In milligram-atoms per liter
AOU (Apparent oxygen utilization)	In milligram-atoms per liter
SATN (Saturation)	Per cent of oxygen saturation
PHOS (Phosphate-phosphorus)	In microgram-atoms per liter ($\mu\text{g-at/l}$)
NITR (Nitrate-nitrogen)	In microgram-atoms per liter ($\mu\text{g-at/l}$)
SIL (Silicate-silicon)	In microgram-atoms per liter ($\mu\text{g-at/l}$)
CHL-A (Chlorophyll <u>a</u>)	In milligrams per cubic meter

PRODUCTIVITY, LAB-I (Incubator productivity)	Expressed as milligrams carbon assimilated per cubic meter per hour.
PRODUCTIVITY, DECK-I (Simulated <u>in situ</u> productivity)	Expressed as milligrams carbon assimilated per cubic meter per day.
LIGHT SAT	Data from light saturation experiments. Refer to text, page 6 of Volume I.
PROD (Productivity)	Productivity of sample receiving the indicated amount of illumination. Expressed as milligrams of carbon assimilated per cubic meter per hour.
FIILT (Filter)	Indicates the per cent of total incubator illumination transmitted to the sample through a neutral density filter. The total incubator illumination in units of lux is listed at the bottom of the Biological Data section.
IRRAD (Irradiance)	Per cent of surface solar radiation reaching the indicated depth.
OXY (Dissolved oxygen)	Units are indicated in the column heading. In the Biological Data section oxygen is reported in milligram-atoms per liter. In the Interpolated and Computed Values oxygen is reported in milliliters per liter.
WATER COLUMN VALUES	Integrated values over the water column from the surface to the bottom of the euphotic zone for CPL-A, LAB-I, and DECK-I. The values at 100 meters and below are not included in this integration because they are below the euphotic zone.
MESSENGER TIME	Messenger time (ship's time, +8 zone) of the productivity cast.
INCOMING SOLAR RADIATION - AM ____ PM ____	Expressed in calories per square centimeter. The AM value is the integrated value of incoming radiation from sunrise to ship's noon; PM represents from ship's noon to sunset.
ZOOPLANKTON	Indicates that zooplankton samples were collected at this station. The information following indicates the type of sampler or net used, the type of tow made, the times of the tow, and the depths sampled, as follows:

(CLARKE-BUMPUS)	Clarke-Bumpus sampler
(HALF-METER NET)	Half-meter net
(MIDWATER TRAWL)	Midwater trawl
HORIZ	Horizontal tow
VERT	Vertical tow
OBL	Oblique tow
STEP	Stepped tow
TIME (from - to)	Ship's time (+8 zone) of the tow
DEPTHS	Depths sampled

Example: Station 318-6

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0154-0204 DEPTHS 100, 70
0232-0243 30, 0

means that two horizontal tows using Clarke-Bumpus were made. The first tow began at 0154 ship's time, lasted until 0204 and sampled at 70 and 100 meters (two samplers on the wire). The second tow sampled at the surface and 30 meters and lasted from 0232 to 0243 ship's time.

LIGHT SATURATION
INCUBATOR ILLU-
MINATION

Total incubator illumination for light saturation experiments. Expressed in lux.

SP VOL ANOMALY
(Specific volume
anomaly, 10^{-5})

The anomaly of specific volume at the indicated temperature, salinity, and pressure compared to a standard water of 0°C temperature and 35 ‰ salinity, at the same pressure. Tabular values multiplied by 10^{-5} will give the anomaly in units of cubic centimeters per gram.

GEOPOT ANOMALY (Geo-
potential anomaly,
EAD)

Geopotential anomaly in dynamic meters of the layer of water between the surface and the indicated depth.

POT ENERGY (Potential
energy anomaly)

Potential energy anomaly in units of 10^8 ergs per square centimeter of the layer of water between the surface and the indicated depth.

VAR RATIO (Variance ratio)

The ratio of the variance of the interpolation polynomial to the variance of the measurement. The value of the variance ratio is an indication of the adequacy of the vertical spacing of the observed values upon which the interpolation is based. See page 7 of Volume I. Values close to 1 indicate optimum spacing. Values greater than 3 indicate that the vertical spacing is inadequate to represent faithfully the distribution of properties in this region of the curve. In the case of missing values, where different combinations of observed values may be used to interpolate at the same depth, the variance ratio which indicates the worst spacing has been printed. Values greater than 100 have been printed as 99.99. If the observed depth corresponds to a desired standard depth, no interpolation is made and the variance ratio is not computed.

E(T) (Temperature interpolation error)

Interpolation error, in degrees Celsius, of the temperature value at this depth. For a discussion of the interpolation error, see page 7 of Volume I. If the observed depth corresponds to a desired standard depth, the interpolation error will be zero.

E(S) (Salinity interpolation error)

Interpolation error, in parts per thousand, of the salinity value at this depth. See comments under E(T) above.

E(O) (Oxygen interpolation error)

Interpolation error, in milliliters per liter, of the oxygen value at this depth. See comments under E(T) above.

*

Indicates a questionable value. See page 8 of Volume I.

†

Indicates a hand-interpolated value. See page 8 of Volume I.

Codes Used for Reporting Observations

Taken from National Oceanographic Data Center Publication M-2, "Processing Physical and Chemical Data from Oceanographic Stations," or U.S. Navy Hydrographic Office Publication No. 606-c, "Hydrographic Office Observers Manual. Bathythermograph Observations," or U.S. Navy Hydrographic Office Publication No. 607, "Instruction Manual for Oceanographic Observations."

Cloud Type (taken from NODC Publication M-2) WMO Code 0500

Code

0	Cirrus	Ci
1	Cirrocumulus	Cc
2	Cirrostratus	Cs
3	Alto cumulus	Ac
4	Altostratus	As
5	Nimbostratus	Ns
6	Stratocumulus	Sc
7	Stratus	St
8	Cumulus	Cu
9	Cumulonimbus	Cb
x	Cloud not visible owing to darkness, fog, duststorm, sandstorm, or other analogous phenomena	

Amount of Cloud Cover (taken from NODC Publication M-2) WMO Code 2700

Code

0	0	0
1	1 okta or less, but not zero	1/10 or less, but not zero
2	2 oktas	2/10 - 3/10
3	3 oktas	4/10
4	4 oktas	5/10
5	5 oktas	6/10
6	6 oktas	7/10 - 8/10
7	7 oktas or more, but not 8 oktas	9/10 or more, but not 10/10
8	8 oktas	10/10
9	Sky obscured, or cloud amount cannot be estimated	

Visibility (taken from NODC Publication M-2) WMO Code 4300

Code

0	Less than 50 metres (less than 55 yards)	
1	50-200 metres	(approx. 55-220 yards)
2	200-500 metres	(approx. 220-550 yards)
3	500-1,000 metres	(approx. 550 yards-5/8 n.m.)
4	1- 2 km	(approx. 5/8-1 n.m.)
5	2- 4 km	(approx. 1- 2 n.m.)
6	4-10 km	(approx. 2- 6 n.m.)
7	10-20 km	(approx. 6-12 n.m.)
8	20-50 km	(approx. 12-30 n.m.)
9	50 km or more	(30 n.m. or more)

Direction (taken from NODC Publication M-2)

Compass Direction from which Wind, Sea, or Swell is coming

Code

00 Calm, or no value
 01 to 36 Each value represents 1/10 of the true direction in degrees, measured clockwise from the north, with 36 representing true north.

State of the Sea - Wind Waves (taken from NODC Publication M-2)

WMO Code 3700

Code	Description	Height (Feet)
0	Calm (Glassy)	0
1	Calm (Rippled)	0 - 1/3
2	Smooth (Wavelets)	1/3 - 1 2/3
3	Slight	1 2/3 - 4
4	Moderate	4 - 8
5	Rough	8 - 13
6	Very Rough	13 - 20
7	High	20 - 30
8	Very High	30 - 45
9	Phenomenal	over 45

Swell Conditions (taken from H.O. 606-c or H.O. 607)

Code	Approx. Height in Feet	Description		Approx. Length in Feet
0	0	No swell		0
1 2	1 - 6	Low swell	Short or average Long	0 - 600 Above 600
3 4 5	6 - 12	Moderate	Short Average Long	0 - 300 300 - 600 Above 600
6 7 8	Greater than 12	High	Short Average Long	0 - 300 300 - 600 Above 600
9	---	Confused		

NUMERICAL WEATHER CODES—PRESENT WEATHER

00	01	02	03	04	05	06	07	08	09
Cloud amount (NOT observed) at time of observation	Clouds generally increasing or decreasing at time of observation	State of sky at time of observation	Clouds generally increasing or decreasing at time of observation	Visibility reduced by smoke	None	Observed but not recorded at time of observation	Observed but not recorded at time of observation	Observed but not recorded at time of observation	Observed but not recorded at time of observation
10	11	12	13	14	15	16	17	18	19
Light fog	Partial or light fog at time of observation	More or less (overcast) at time of observation	Lightning (not thunder) at time of observation	Precipitation with light but NOT heavy rain or snow	Precipitation with light rain or snow	Precipitation with heavy rain or snow	Thunder heard but no precipitation at time of observation	Thunder heard but no precipitation at time of observation	Thunder heard but no precipitation at time of observation
20	21	22	23	24	25	26	27	28	29
Drizzle (NOT heavy) at time of observation	Drizzle (NOT heavy) at time of observation	Drizzle (NOT heavy) at time of observation	Drizzle (NOT heavy) at time of observation	Freezing drizzle at time of observation	Drizzle (NOT heavy) at time of observation	Drizzle (NOT heavy) at time of observation	Drizzle (NOT heavy) at time of observation	Drizzle (NOT heavy) at time of observation	Drizzle (NOT heavy) at time of observation
30	31	32	33	34	35	36	37	38	39
Light or moderate rain or drizzle at time of observation	Light or moderate rain or drizzle at time of observation	Light or moderate rain or drizzle at time of observation	Light or moderate rain or drizzle at time of observation	Light or moderate rain or drizzle at time of observation	Light or moderate rain or drizzle at time of observation	Light or moderate rain or drizzle at time of observation	Light or moderate rain or drizzle at time of observation	Light or moderate rain or drizzle at time of observation	Light or moderate rain or drizzle at time of observation
40	41	42	43	44	45	46	47	48	49
Fog at distance at time of observation	Fog at distance at time of observation	Fog at distance at time of observation	Fog at distance at time of observation	Fog at distance at time of observation	Fog at distance at time of observation	Fog at distance at time of observation	Fog at distance at time of observation	Fog at distance at time of observation	Fog at distance at time of observation
50	51	52	53	54	55	56	57	58	59
Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation
60	61	62	63	64	65	66	67	68	69
Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation
70	71	72	73	74	75	76	77	78	79
Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation	Intermediate rain or drizzle at time of observation
80	81	82	83	84	85	86	87	88	89
Light rain or drizzle at time of observation	Light rain or drizzle at time of observation	Light rain or drizzle at time of observation	Light rain or drizzle at time of observation	Light rain or drizzle at time of observation	Light rain or drizzle at time of observation	Light rain or drizzle at time of observation	Light rain or drizzle at time of observation	Light rain or drizzle at time of observation	Light rain or drizzle at time of observation
90	91	92	93	94	95	96	97	98	99
Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation	Heavy rain or drizzle at time of observation

This code will be found in NODC Publ. M-2. WMO Code 4677

Water Color (taken from NODC Publication M-2)

Forel-Ule scale and conversions from per cent yellow and
per cent brown scales

Per Cent Yellow	Per Cent Brown	Forel-Ule Scale	Code
0		I	01
2		II	02
5		III	03
9		IV	04
14		V	05
20		VI	06
27		VII	07
35		VIII	08
44		IX	09
54		X	10
65	0	XI	11
	2	XII	12
	5	XIII	13
	9	XIV	14
	14	XV	15
	20	XVI	16
	27	XVII	17
	35	XVIII	18
	44	XIX	19
	54	XX	20
	65	XXI	21

Height of Dominant Waves (taken from NODC Publication M-2) WMO Code 1555

Code

0 Less than 1/4 m (1 ft)
 1 1/2 m (1 1/2 ft)
 2 1 m (3 ft)
 3 1 1/2 m (5 ft)
 4 2 m (6 1/2 ft)
 5 2 1/2 m (8 ft)
 6 3 m (9 1/2 ft)
 7 3 1/2 m (11 ft)
 8 4 m (13 ft)
 9 4 1/2 m (14 ft)
 x Height not determined

Code If 50 is added to direction

0 5 m (16 ft)
 1 5 1/2 m (17 1/2 ft)
 2 6 m (19 ft)
 3 6 1/2 m (21 ft)
 4 7 m (22 1/2 ft)
 5 7 1/2 m (24 ft)
 6 8 m (25 1/2 ft)
 7 8 1/2 m (27 ft)
 8 9 m (29 ft)
 9 9 1/2 m (30 1/2 ft)

Period of Dominant Waves (taken from NODC Publication M-2) WMO Code 3155

Code		CODE	
2	5 seconds or less	8	16 or 17 seconds
3	6 or 7 seconds	9	18 or 19 seconds
4	8 or 9 seconds	0	20 or 21 seconds
5	10 or 11 seconds	1	Over 21 seconds
6	12 or 13 seconds	x	Calm, or period not determined
7	14 or 15 seconds		

Present Weather (taken from NODC Publication M-2) WMO Code 4501

Code
figure

- 0 Clear (no cloud at any level)
- 1 Partly cloudy (scattered or broken)
- 2 Continuous layer(s) or cloud(s)
- 3 Sandstorm, duststorm, or blowing snow
- 4 Fog, thick dust or haze
- 5 Drizzle
- 6 Rain
- 7 Snow, or rain and snow mixed
- 8 Shower(s)
- 9 Thunderstorm(s)

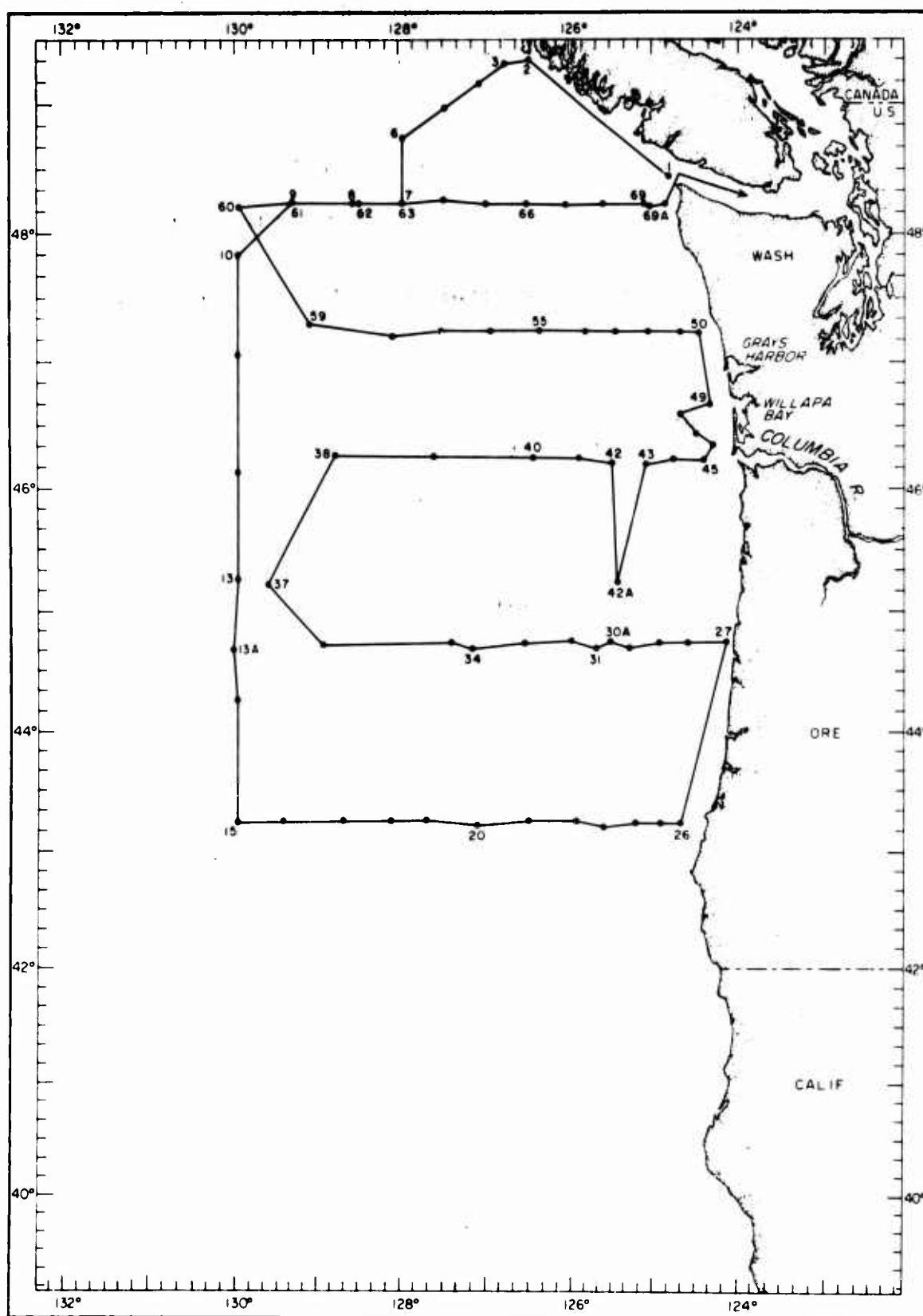


Fig. 1. Station locations Oshawa Cruise 001, 12-26 March 1963.

CNAV OSHAWA CRUISE 051 STATION 001 OBSERVED VALUES

TATOOSH ISLAND

DATE 13/03/63 HR 03.1 LAT 48-27 N LONG 124-51 W SNOG 283 WEA 02 WIND VEL 5 DIR 24
 BAROM 25.0 TEMP DRY 7.2 WET 6.1 RELHU 85 WTRCLR SECD1 SEA 2 DIR 24 SWELL 4 DIR 27
 CLOUD TYPE AMT 2 VIS 7 WIRE ANGLE(S) 0, 7

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	8.07	31.283	24.37	6.27	0.560	0.027	95
1	5	7.96	31.293	24.39	6.06	0.541	0.047	92
1	10	7.99	31.302	24.40	6.15	0.549	0.038	93
1	25	7.66	31.407	24.53	5.65	0.505	0.087	85
1	35	7.68	31.511	24.61	5.42	0.484	0.107	82
1	55	7.82	32.399	25.28	4.35	0.389	0.197	66
1	80	7.78	33.405	26.08	3.33	0.297	0.285	51
1	105	7.50	33.580	26.25	3.03	0.271	0.314	46
1	130	7.48	33.707	26.36	2.70	0.241	0.344	41
1	155	7.18	33.816	26.48	2.46	0.220	0.369	37
1	173	7.09	33.856	26.53	2.37	0.212	0.378	36
1	198	6.88	33.895	26.59	2.25	0.201	0.391	34
1	277	6.38	33.984	26.72	1.83	0.163	0.436	27

CNAV OSHAWA CRUISE 051 STATION 001 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
0	0.97		31.286
5	1.00		31.283
17	0.82		31.401
33	0.49		31.580

26.35 - WATER COLUMN VALUES

MESSENGER TIME 1911

CNAV OSHAWA			CRUISE OSI		STATION 001		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	8.07	0.00	31.283	0.000	24.37	356.4	0.000	0.00	6.27	0.00		
10	7.99	0.00	31.302	0.000	24.40	354.1	0.036	0.02	6.15	0.00		
20	7.78	0.04	31.362	0.002	24.48	346.8	0.072	0.07	5.87	0.05	0.99	
30	7.66	0.01	31.443	0.008	24.56	339.3	0.106	0.16	5.54	0.01	0.56	
50	7.79	0.01	32.138	0.031	25.08	289.6	0.169	0.42	4.65	0.03	0.75	
75	7.81	0.00	33.242	0.019	25.94	208.1	0.232	0.81	3.49	0.01	0.77	
100	7.56	0.01	33.580	0.021	26.25	179.8	0.281	1.24	3.06	0.02	0.77	
150	7.24	0.01	33.797	0.001	26.46	160.2	0.367	2.33	2.50	0.00	0.82	
200	6.86	0.00	33.898	0.000	26.59	148.4	0.444	3.72	2.24	0.00	9.67	
250	6.44	0.03	33.949	0.003	26.69	139.6	0.517	5.39	1.99	0.00	56.20	

CNAV OSHAWA			CRUISE OSI		STATION 002		OBSERVED VALUES				
DATE	HR	LAT	49-20 N	LONG	126-33 W	SNDC	73	WEA	03	WIND	VEL
13/03/63	12.3	6.7	WE	5.0	RELHU	77	WTRCLR	SEA	1	DIR	32
BAROM	22.0	6.7	WE	5.0	RELHU	77	WTRCLR	SEA	1	DIR	32
CLOUD TYPE	AMT	2	VIS	7	WIRE	ANGLE(S)	0				

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	AOU	SATN
1	0	8.49	32.105	24.95				
1	5	8.48	32.130	24.97				
1	10	8.59	32.363	25.14				
1	20	8.71						
1	30	7.99	33.368	26.02				
1	50	7.96	33.462	26.09				

CNAV OSHAWA CRUISE 051 STATION 003 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY
LAB-1 DECK-1 SAL

0 0.42 17.80 31.648
0 16.56

MESSENGER TIME 0620 INCOMING SOLAR RADIATION - AM 77 PM 64

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
INTENSITY INSTEAD OF 100 PERCENT

DEPTH	CNAV OSHAWA TEMP	E(T)	CRUISE 051 SAL	E(S)	STATION 003 SIGMA-T	INTERPOLATED AND COMPUTED VALUES					VAR RATIO	
						SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	8.49	0.00										
10	8.52	0.00	31.637	0.000	24.58	336.5						
20	8.58	0.00	31.737	0.000	24.65	330.0						
30	8.20	0.00	32.985	0.000	25.69	232.0						
50	7.88	0.00	33.493	0.000	26.13	190.0			3.71	0.00		
75	7.43	0.00	33.817	0.000	26.45	160.1			2.85	0.00		
100	6.67	0.00	33.938	0.000	26.65	141.4			2.25	0.00		

CNAV OSHAWA CRUISE 051 STATION 004 OBSERVED VALUES

DATE 13/03/63 MR 16.5 LAT 49-08 N LONG 127-09 W WEA 60 WIND VEL 10 DIR 15
 BAROM 18.0 TEMP DRY 5.6 WET 4.4 RELHU 83 WTRCLR SECDI 1298
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 10, 6, 5 SEA 1 DIR 15 SWELL 2 DIR 27

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	8.43	31.724	24.67	6.66	0.595	-0.015	103	
1	5	8.42	31.756	24.69	6.67	0.596	-0.016	103	
1	10	8.44	31.736	24.67	6.72	0.600	-0.020	104	
1	20	8.44	31.762	24.69	6.77	0.605	-0.025	104	
1	29	8.46	31.766	24.69	6.68	0.597	-0.017	103	
1	49	8.52	32.655	25.38	5.59	0.499	0.076	87	
1	74	7.82	33.242	25.94	4.65	0.415	0.167	71	
1	98	7.52	33.609	26.27	3.91	0.349	0.235	60	
1	123	7.59	33.797	26.41	2.96	0.264	0.319	45	
1	147	7.22	33.886	26.53	3.08	0.275	0.313	47	
2	174	6.88	33.868	26.57	2.91	0.260	0.333	44	
2	199	6.68	33.958	26.66	2.51	0.224	0.371	38	
2	298	5.72	34.018	26.83	1.74	0.155	0.433	27	
2	497	4.63	34.185	27.09	0.62	0.055	0.569	9	
3	745	4.02	34.294	27.24	0.28	0.025	0.609	4	
3	995	3.38	34.422	27.41	0.31	0.028	0.616	4	

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CNAV OSHAWA CRUISE 051 STATION 004 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.65		31.731
6	0.75		31.733
19	0.66		31.752
38	0.37		32.091

23.14 - WATER COLUMN VALUES

MESSANGER TIME 0830 INCOMING SOLAR RADIATION - AM 77 PM 64

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 004		INTERPOLATED AND COMPUTED VALUES						VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)			
0	8.43	0.00	31.724	0.000	24.67	328.6	0.000	0.00	6.66	0.00	0.99		
10	8.44	0.00	31.736	0.000	24.67	328.0	0.034	0.02	6.72	0.00			
20	8.44	0.00	31.762	0.000	24.69	326.2	0.067	0.07	6.77	0.00			
30	8.47	0.00	31.800	0.013	24.72	323.9	0.099	0.15	6.64	0.01			
50	8.50	0.01	32.686	0.002	25.41	258.8	0.158	0.39	5.55	0.00	0.95		
75	7.80	0.00	33.261	0.000	25.96	206.6	0.217	0.75	4.62	0.00	0.94		
100	7.53	0.01	33.629	0.001	26.29	175.8	0.265	1.18	3.82	0.02	0.89		
150	7.18	0.00	33.893	0.001	26.54	152.2	0.347	2.23	3.08	0.00	0.99		
200	6.67	0.00	33.959	0.000	26.67	141.3	0.421	3.55	2.50	0.00	1.02		
250	6.18	0.02	33.994	0.005	26.76	133.1	0.491	5.14	2.02	0.05	1.26		
300	5.70	0.00	34.020	0.000	26.84	125.9	0.556	6.99	1.73	0.00	1.00		
400	5.06	0.02	34.104	0.006	26.98	112.9	0.676	11.29	1.08	0.01	0.78		
500	4.62	0.00	34.187	0.000	27.10	102.7	0.785	16.30	0.61	0.00	0.99		
600	4.33	0.03	34.236	0.005	27.17	96.7	0.886	21.98	0.39	0.03	0.69		
700	4.10	0.02	34.278	0.003	27.22	91.9	0.981	28.33	0.28	0.02	0.78		
800	3.91	0.02	34.316	0.003	27.27	87.8	1.072	35.33	0.28	0.02	1.21		

CNAV OSHAWA				CRUISE 051		STATION 005		OBSERVED VALUES			
DATE 13/03/63		HR 20.4	LAT 48-57 N	LONG 127-31 W	WEA 18	WIND VEL 20 DIR 19	SEA 3	DIR 19	SWELL 2	DIR 27	
BAROM 14.		TEMP DRY 6.7	WET 6.7	RELHU 99	WTRCLR						
CLOUD TYPE		AMT 8	VIS 6	WIRE ANGLE(S) 23.15							
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN			
1	0	8.53	32.105	24.95	6.66	0.595	-0.018	103			
1	5	8.53	32.098	24.94	6.70	0.598	-0.021	104			
1	9	8.54	32.134	24.97	6.74	0.602	-0.025	104			
1	18	8.50	32.095	24.94	6.72	0.600	-0.023	104			
1	28	8.52	32.107	24.95	6.75	0.603	-0.026	104			
1	46	8.63	32.153	24.97	6.68	0.597	-0.021	104			
1	69	8.60	32.489	25.24	6.24	0.557	0.017	97			
1	92	7.72	33.218	25.94	4.72	0.422	0.162	72			
1	116	7.86	33.737	26.32	3.09	0.276	0.303	48			
1	139	7.62	33.774	26.39	2.77	0.247	0.335	42			
2	147	7.60	33.774	26.39	2.77	0.247	0.335	42			
2	171	7.54	33.840	26.45	2.65	0.237	0.347	41			
2	195	7.38	33.799	26.44	2.60	0.232	0.354	40			
2	239	6.38	33.982	26.72	2.12	0.189	0.410	32			
2	492	4.96	34.083	26.98	0.88	0.079	0.542	13			
2	739	4.12	34.266	27.21	0.30	0.027	0.606	4			
3	968	3.72	34.358	27.33	0.26	0.023	0.615	4			
3	1452	2.72	34.502	27.53	0.68	0.061	0.594	9			
3	1743	2.32	34.540	28.43	0.85	0.076	0.585	11			

CNAV OSHAWA CRUISE OSI STATION 005 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.68	12.62		32.178
7	0.69	11.58		32.162
23	0.68	1.88		32.171
46	0.55	0.00		32.283

29.86 214.00 - WATER COLUMN VALUES

MESSANGER TIME 1224 INCOMING SOLAR RADIATION - AM 77 PM 64

CNAV OSHAWA			CRUISE OSI		STATION 005		INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.53	0.00	32.105	0.000	24.95	301.6	0.000	0.00	6.66	0.00	0.97
10	8.54	0.00	32.133	0.004	24.97	299.8	0.031	0.02	6.74	0.00	0.78
20	8.50	0.00	32.095	0.001	24.94	302.3	0.061	0.06	6.73	0.00	0.93
30	8.53	0.00	32.107	0.003	24.95	302.0	0.092	0.14	6.75	0.00	
50	8.66	0.02	32.186	0.002	24.99	298.3	0.152	0.39	6.66	0.02	0.82
75	8.36	0.06	32.670	0.020	25.41	258.4	0.222	0.83	5.90	0.03	0.72
100	7.73	0.05	33.432	0.009	26.10	193.3	0.279	1.33	4.11	0.05	0.69
150	7.58	0.01	33.789	0.004	26.41	165.5	0.369	2.48	2.72	0.02	0.87
200	7.28	0.02	33.908	0.001	26.54	153.3	0.450	3.91	2.56	0.01	1.00
250	6.24	0.05	33.992	0.005	26.75	133.9	0.522	5.57	2.03	0.01	1.15
300	5.67	0.21	34.033	0.023	26.85	124.5	0.587	7.41	1.67	0.06	1.80
400	5.02	0.26	34.080	0.029	26.97	114.2	0.708	11.71	1.14	0.07	1.70
500	4.93	0.00	34.089	0.001	26.98	113.6	0.823	17.03	0.85	0.00	0.95
600	4.53	0.00	34.163	0.007	27.09	104.5	0.933	23.24	0.55	0.00	0.65
700	4.22	0.00	34.237	0.004	27.18	96.3	1.034	30.00	0.35	0.00	0.81
800	4.00	0.01	34.295	0.002	27.25	90.3	1.129	37.26	0.26	0.01	0.70
1000	3.65	0.01	34.370	0.000	27.34	82.3	1.303	53.15	0.28	0.01	0.97
1200	3.23	0.03	34.438	0.001	27.44	73.9	1.461	71.18	0.43	0.04	0.91
1500	2.64	0.01	34.511	0.000	27.55	63.4	1.670	99.98	0.72	0.01	0.98

CNAV OSHAWA CRUISE 051 STATION 006 OBSERVED VALUES									
DATE 14/03/63	HR 01.3	LAT 48-44 N	LONG 128-00 W	SEA 2 DIR 27	WIND VEL 6 DIR 27				
BAROM 09.	TEMP DRY 5.6	WET 4.4	RELHU 83	WTRCLR	SEA 2 DIR 27	WIND VEL 6 DIR 27			
CLOUD TYPE	AMT 7	VIS 7	WIRE ANGLE(S) 5.15						
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	8.67	32.162	24.97	6.70	0.598	-0.023		104
1	5	8.66	32.164	24.97	6.70	0.598	-0.023		104
1	10	8.69	32.232	25.02	6.72	0.600	-0.026		104
1	20	8.70	32.200	25.00	6.65	0.594	-0.020		103
1	30	8.72	32.212	25.00	6.64	0.593	-0.019		103
1	50	8.74	32.272	25.05	6.61	0.590	-0.017		103
1	75	8.50	32.601	25.34	6.04	0.539	0.036		94
1	100	7.67	33.175	25.91	4.86	0.434	0.150		74
1	125	7.37	33.588	26.28	4.05	0.362	0.225		62
2	145	7.52	33.806	26.43	3.13	0.280	0.304		48
1	150	7.47	33.782	26.42	3.20	0.286	0.299		49
2	169	7.24	33.872	26.52	3.24	0.289	0.298		49
2	194	6.92	33.899	26.58	3.48	0.311	0.281		53
2	291	5.98	33.992	26.78	1.78	0.159	0.446		26
2	488	4.79	34.101	27.01	0.77	0.069	0.554		11
2	735	4.06	34.262	27.22	0.33	0.029	0.604		5
2	983	3.46	34.384	27.37	0.31	0.028	0.615		4
2	1481	2.52	34.516	27.56	1.00	0.089	0.569		14

CNAV OSHAWA CRUISE 051 STATION 006 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.66			32.122
7	0.73			32.120
23	0.74			32.158
46	1.03			32.301

36.95 - WATER COLUMN VALUES

MESSANGER TIME 1800 INCOMING SOLAR RADIATION - AM 77 PM 64

CNAV OSHAWA				CRUISE 051		STATION 006		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	8.67	0.00	32.162	0.000	24.97	299.4	0.000	0.00	6.70	0.00			
10	8.69	0.00	32.232	0.000	25.02	294.6	0.030	0.02	6.72	0.00			
20	8.70	0.00	32.200	0.000	25.00	297.3	0.060	0.06	6.65	0.00			
30	8.72	0.00	32.212	0.000	25.00	296.9	0.090	0.14	6.64	0.00			
50	8.74	0.00	32.272	0.000	25.05	293.0	0.150	0.38	6.61	0.00			
75	8.50	0.00	32.601	0.000	25.34	265.5	0.220	0.83	6.04	0.00			
100	7.67	0.00	33.175	0.000	25.91	211.6	0.280	1.36	4.86	0.00			
150	7.47	0.00	33.782	0.000	26.42	164.5	0.375	2.55	3.20	0.00			
200	6.85	0.00	33.905	0.000	26.60	147.7	0.453	3.95	3.42	0.05	1.09		
250	6.33	0.01	33.955	0.000	26.71	137.9	0.525	5.61	2.71	0.20	1.17		
300	5.91	0.00	33.998	0.001	26.79	130.0	0.593	7.51	1.69	0.02	0.98		
400	5.23	0.02	34.058	0.005	26.92	118.4	0.718	11.99	0.98	0.11	0.77		
500	4.74	0.01	34.109	0.001	27.02	109.9	0.834	17.30	0.73	0.00	0.94		
600	4.40	0.03	34.175	0.003	27.11	102.0	0.941	23.33	0.49	0.02	0.68		
700	4.13	0.01	34.240	0.001	27.19	95.1	1.040	29.98	0.35	0.01	0.82		
800	3.89	0.00	34.298	0.000	27.26	88.9	1.133	37.13	0.29	0.01	0.72		
1000	3.42	0.00	34.391	0.000	27.38	78.1	1.302	52.67	0.32	0.00	1.15		
1200	3.02	0.01	34.460	0.000	27.47	69.8	1.452	69.56	0.53	0.03	3.31		

CNAV OSHAWA CRUISE OSI STATION 007 OBSERVED VALUES									
DATE 14/03/63		HR 06.8	LAT 48-14 N	LONG 128-00 W	WEA 02	WIND VEL 20 DIR 30			
BAROM 07.5		TEMP DRY 5.6	WET 4.4	RELHU 83	WTRCLR	SNDG 2651	SEA 3	DIR 28	SWELL 1 DIR 25
CLOUD TYPE		AMT 4	VIS 7	WIRE ANGLE(S) 20.24					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN	
1	0	8.15*	32.387	25.22					
1	5	8.64	32.391	25.15					
1	9	8.64	32.402	25.16	6.80	0.607	-0.033	106	
1	19	8.68	32.396	25.15					
1	28	8.19*	32.399	25.23	6.79	0.606	-0.026	104	
1	47	8.64	32.406	25.17	6.75	0.603	-0.029	105	
1	71	8.68	32.406	25.16	6.74	0.602	-0.028	105	
1	94	8.08	33.374	26.01	4.01	0.358	0.220	62	
1	118	7.76	33.711	26.32	2.96	0.264	0.317	46	
1	142	7.60	33.800	26.41	2.52	0.225	0.358	39	
2	163	7.53	33.858	26.47	2.27	0.203	0.381	35	
2	185	7.42	33.880	26.50	2.13	0.190	0.395	33	
2	279	6.91	33.974	26.64	2.16	0.188	0.404	32	
2	468	5.66	34.096	26.90	1.41	0.126	0.483	21	
2	705	4.25	34.235	27.17	0.36	0.032	0.598	5	
2	943*		34.438		0.31	0.028			
2	1420*	2.74	34.548	27.57	0.58	0.052	0.602	8	
2	1707	2.32	34.545	27.60	0.90	0.080	0.581	12	

CNAV OSHAWA		CRUISE OSI		STATION 007		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.64*	0.00	32.387	0.000	25.15	282.2	0.000	0.00			
10	8.64	0.00	32.402	0.001	25.16	281.3	0.029	0.02	6.80	0.00	1.06
20	8.68	0.00	32.396	0.000	25.15	282.5	0.057	0.06	6.79	0.02	1.38
30	8.67	0.01	32.400	0.000	25.16	282.2	0.086	0.13	6.79	0.00	1.03
50	8.66	0.01	32.378	0.019	25.14	284.0	0.143	0.37	6.83	0.05	0.86
75	8.59	0.02	32.563	0.038	25.30	269.6	0.212	0.81	6.30	0.10	0.78
100	7.98	0.00	33.502	0.014	26.12	191.5	0.271	1.32	3.63	0.04	0.73
150	7.57	0.00	33.825	0.001	26.44	162.6	0.360	2.45	2.41	0.00	0.64
200	7.34	0.00	33.896	0.000	26.52	155.0	0.440	3.88	2.11	0.03	1.29
250	7.07	0.00	33.946	0.001	26.60	148.4	0.516	5.65	2.11	0.05	1.10
300	6.78	0.01	33.990	0.001	26.68	141.8	0.590	7.71	2.11	0.02	0.95
400	6.12	0.02	34.058	0.003	26.81	129.6	0.726	12.60	1.75	0.04	0.75
500	5.45	0.00	34.116	0.000	26.94	118.0	0.851	18.35	1.26	0.01	0.87
600	4.84	0.01	34.176	0.000	27.06	107.2	0.965	24.76	0.80	0.02	0.60
700	4.28	0.00	34.232	0.000	27.17	97.3	1.068	31.64	0.38	0.00	0.95
800	3.75	0.02	34.285	0.001	27.27	88.2	1.162	38.85	0.35*		3.12
1000	2.87	0.09	34.380	0.004	27.42	72.9	1.325	53.78	0.35*		15.46
1200	2.26	0.14	34.455	0.007	27.54	61.8	1.462	69.12	0.45*		31.35
1500	1.98	0.13	34.528	0.007	27.62	54.7	1.639	93.61	0.70*		22.26
SURFACE TEMPERATURE ASSUMED FOR PURPOSES OF INTERPOLATION.											

CNAV OSHAWA CRUISE 051 STATION 008 OBSERVED VALUES
 DATE 14/03/63 HR 11.2 LAT 48-14 N LONG 128-32 W WEA 01 WIND VEL 30 DIR 27
 BAROM 07.5 TEMP DRY 5.6 WET 4.4 REL HU 83 WTR CLR SEA 3 DIR 28 SWELL 3 DIR 25
 CLOUD TYPE 8 AMT 3 VIS 7 WIRE ANGLE(S) 26,30,43

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		SATN	
					ML/L	MGA/L	AOU	
1	0		32.390		6.71	0.599		
1	4	8.78	32.451	25.18	6.67	0.596	-0.023	104
1	9	8.79	32.385	25.13	6.67	0.596	-0.023	104
1	18	8.76	32.388	25.13	6.69	0.598	-0.025	104
1	27	8.78	32.448	25.18	6.58	0.588	-0.015	103
1	45	8.84	32.381	25.12	6.62	0.591	-0.019	103
1	67	8.80	32.388	25.13	6.72	0.600	-0.028	105
1	90	8.18	32.828	25.57	5.54	0.495	0.084	85
1	112	8.12	33.406	26.03	4.05	0.362	0.216	63
1	134	7.75	33.705	26.32	3.18	0.284	0.297	49
2	154*	7.80	33.653	26.27	3.39	0.303	0.278	52
2	176	7.58	33.858	26.46	3.18	0.284	0.299	49
2	265	6.50	33.972	26.70	2.16	0.193	0.405	32
2	442	5.16	34.071	26.94	0.99	0.088	0.529	14
2	667	4.19	34.215	27.16	0.40	0.036	0.596	6
2	891	3.69	34.356	27.33	0.32	0.029	0.611	4
2	1345	2.75	34.494	27.53	0.52	0.046	0.608	7
3	1613	2.34	34.539	27.60	0.78	0.070	0.591	11

CNAV OSHAWA CRUISE 051 STATION 008 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	SAL
0	0.42	4.76	32.506
0		6.94	

MESSANGER TIME 0615 INCOMING SOLAR RADIATION - AM 152 PM 214
 THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
 INTENSITY INSTEAD OF 100 PERCENT

CNAV OSHAWA				STATION 008				INTERPOLATED AND COMPUTED VALUES			
DEPTH	TEMP	E(T)	SAL	E(S)	SEGMENT	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OX %	ECOI	VAR RATIO
0	8.78*	0.00	32.390	0.000	25.13	284.0	0.000	0.00	6.71	0.00	0.93
10	8.79	0.00	32.380	0.002	25.12	285.0	0.023	0.02	5.17	0.00	0.75
20	8.76	0.00	32.402	0.003	25.14	283.2	0.058	0.06	6.67	0.01	0.93
30	8.79	0.00	32.443	0.007	25.17	280.8	0.083	0.13	6.57	0.01	0.93
50	8.86	0.01	32.361	0.009	25.10	284.2	0.144	0.37	6.09	0.04	0.72
75	8.59	0.04	32.506	0.010	25.25	279.8	0.214	0.62	5.41	0.04	0.48
100	8.14	0.03	33.098	0.018	25.38	223.8	0.277	1.38	4.85	0.04	0.64
150	7.66	0.04	33.799	0.019	25.40	163.8	0.315	2.60	3.07	0.10	0.80
200	7.32	0.04	33.905	0.008	26.53	153.1	0.366	4.04	2.95	0.05	0.90
250	6.71	0.03	33.964	0.006	26.66	142.1	0.500	5.76	2.37	0.04	0.77
300	6.17	0.01	33.998	0.005	26.76	133.4	0.600	7.32	1.86	0.01	0.91
400	5.41	0.02	34.055	0.006	26.90	120.8	0.728	12.30	1.19	0.02	0.76
500	4.85	0.01	34.107	0.001	27.01	111.3	0.845	17.69	0.77	0.02	0.76
600	4.41	0.01	34.171	0.001	27.11	102.4	0.953	23.77	0.50	0.02	0.71
700	4.10	0.01	34.237	0.001	27.19	94.9	1.053	30.42	0.37	0.01	0.82
800	3.86	0.02	34.302	0.002	27.27	68.2	1.145	37.54	0.31	0.02	0.59
1000	3.45	0.01	34.402	0.004	27.39	77.6	1.313	52.98	0.33	0.01	0.92
1200	3.03	0.01	34.465	0.004	27.48	69.5	1.462	69.77	0.41	0.01	0.88
1500	2.49	0.00	34.520	0.002	27.57	61.1	1.661	97.22	0.66	0.00	0.71

SURFACE TEMPERATURE ASSUMED FOR PURPOSES OF INTERPOLATION.

CNAV OSHAWA CRUISE OSI STATION 009 OBSERVED VALUES									
DATE 14/03/63 HR 18.8 LAT 48-14 N LONG 129-18 W WEA 02 WIND VEL 30 DIR 32									
BAROM 08. TEMP DRY 7.8 WET 5.6 RELHU 72 WTRCLR SECDI 2834 SEA 4 DIR 32 SWELL 4 DIR 29									
CLOUD TYPE VIS 7 WIRE ANGLE(S) 10.25.43									
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0		32.435		6.76	0.604			
1	5	8.44	32.434	25.22	6.84	0.611	-0.034		106
1	10	8.44	32.436	25.22	6.70	0.598	-0.021		104
1	20	8.42	32.496	25.27	6.72	0.600	-0.023		104
1	29	8.43	32.427	25.21	6.76	0.604	-0.027		105
1	49	8.47	32.435	25.21	6.72	0.600	-0.024		104
1	74	8.46	32.429	25.21	6.72	0.600	-0.023		104
1	98	7.88	32.722	25.53	6.10	0.545	0.039		93
1	123	7.06	33.312	26.10	4.82	0.430	0.162		73
1	148	7.08	33.644	26.36	4.12	0.368	0.223		62
2	154	7.07	33.702	26.41	4.33	0.387	0.204		65
2	177	6.88	33.829	26.53	4.12	0.368	0.225		62
2	267	5.62	33.912	26.76	3.02	0.270	0.341		44
2	454	4.43	34.004	26.97	1.47	0.131	0.498		21
2	690	4.00	34.244	27.21	0.37	0.033	0.602		5
2	930	3.50	34.362	27.35	0.31	0.028	0.615		4
3	1416	2.58	34.505	27.55	0.63	0.056	0.601		9
3	1662	2.22	34.552	27.62	0.97	0.087	0.576		13

CNAV OSHAWA		CRUISE OSI	STATION 009	BIOLOGICAL DATA
DEPTH	CHL-A	PRODUCTIVITY LAB-I	SAL	
0	0.39	2.70	32.427	
8	0.36	4.64	32.469	
27	0.37	0.70	32.427	
54	0.38	0.10	32.436	
19.98		90.84	- WATER COLUMN VALUES	
MESSENGER TIME 1049		INCOMING SOLAR RADIATION - AM 152 PM 214		

CNAV OSHAWA CRUISE OSI STATION 010 OBSERVED VALUES									
DATE 15/03/63		HR 12.0	LAT 47-49 N	LONG 130-00 W	WEA 62	WIND VEL 22 DIR 28	SEA 4 DIR 28	SWELL 4 DIR 27	
BAROM 08.		TEMP DRY 5.6	WET 5.6	RELHU 99	WTRCLR	SECDI			
CLOUD TYPE		AMT 8	VIS 7	WIRE ANGLE(S)	0, 0				
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0		32.469		6.66	0.595			
1	5	8.79	32.466	25.19	6.64	0.593	-0.021		104
1	10	8.82	32.466	25.19	6.64	0.593	-0.021		104
1	20	8.81							
1	30	8.82	32.543	25.25	6.63	0.592	-0.021		104
1	50	8.84	32.473	25.19	6.68	0.597	-0.025		104
1	75	8.84	32.469	25.19	6.68	0.597	-0.025		104
1	100	8.83	32.469	25.19	6.70	0.598	-0.027		105
1	125	8.81	32.465	25.19	6.67	0.596	-0.024		104
1	150	7.16	32.757	25.65	6.07	0.542	0.051		91
2	171	6.80	33.702	26.45	4.64	0.414	0.180		70
2	194	6.92	33.861	26.55	4.10	0.366	0.226		62
2	291	5.54	33.910	26.77	3.25	0.290	0.322		47
2	489	4.19	34.021	27.01	1.34	0.120	0.513		19
2	737	3.77	34.257	27.24	0.43	0.038	0.600		6
2	984	3.37	34.399	27.39	0.32	0.029	0.616		4
2	1482	2.53	34.496	27.55	0.59	0.053	0.605		8
2	1698	2.18	34.546	27.62	1.01	0.090	0.573		14

CNAV OSHAWA CRUISE OSI STATION O10 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY SAL
LAB-I DECK-I
0 0.17 2.44 32.464
0 3.52

MESSENGER TIME 0635 INCOMING SOLAR RADIATION - AM 149 PM 150

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
INTENSITY INSTEAD OF 100 PERCENT

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.79*	0.00	32.469	0.000	25.19	278.3	0.000	0.00	6.66	0.00	
10	8.82	0.00	32.466	0.000	25.19	279.1	0.029	0.01	6.64	0.00	
20	8.81	0.00	32.506	0.011	25.22	276.2	0.057	0.06	6.63	0.00	1.32
30	8.82	0.00	32.543	0.000	25.25	273.8	0.084	0.13	6.63	0.00	
50	8.84	0.00	32.473	0.000	25.19	279.6	0.140	0.36	6.68	0.00	
75	8.84	0.00	32.469	0.000	25.19	280.3	0.210	0.81	6.68	0.00	
100	8.83	0.00	32.469	0.000	25.19	280.6	0.281	1.45	6.70	0.00	
150	7.16	0.00	32.757	0.000	25.65	236.5	0.411	3.09	6.07	0.00	
200	6.87	0.03	33.879	0.010	26.57	149.9	0.509	4.79	4.01	0.02	1.12
250	6.28	0.14	33.950	0.041	26.71	137.6	0.581	6.45	3.47	0.10	1.27
300	5.45	0.01	33.914	0.000	26.78	130.6	0.649	8.36	3.15	0.01	0.98
400	4.62	0.04	33.966	0.002	26.92	118.2	0.774	12.84	2.15	0.05	0.77
500	4.16	0.01	34.031	0.001	27.02	109.1	0.889	18.12	1.27	0.01	0.95
600	3.91	0.06	34.126	0.008	27.12	100.2	0.995	24.08	0.78	0.03	0.68
700	3.79	0.03	34.221	0.004	27.21	92.5	1.092	30.57	0.49	0.02	0.81
800	3.67	0.00	34.301	0.001	27.29	86.1	1.182	37.52	0.36	0.02	0.72
1000	3.34	0.00	34.404	0.001	27.40	76.3	1.347	52.63	0.32	0.00	0.98
1200	3.01	0.00	34.455	0.011	27.47	70.0	1.495	69.35	0.34	0.01	1.00
1500	2.50	0.00	34.499	0.001	27.55	62.7	1.697	97.26	0.62	0.00	0.95

SURFACE TEMPERATURE ASSUMED FOR PURPOSES OF INTERPOLATION.

CNAV OSHAWA CRUISE 051 STATION 011 OBSERVED VALUES										
DATE 15/03/63		HR 20.2	LAT 47-02 N	LONG 130-00 W	WEA 01	WIND VEL 28	DIR 30	SEA 4	DIR 30	
BAROM 97		TEMP DRY 7.8	WET 7.8	RELHU 99	WTRCLR					
CLOUD TYPE 6		AMT 4	VIS 7	WIRE ANGLE(S) 27.45					SWELL 4	DIR 28
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN	
1	0		32.506		6.59	0.589				
1	4	9.17	32.547	25.19	6.61	0.590	-0.024		104	
1	9	9.28	32.540	25.17	6.62	0.591	-0.026		105	
1	18	9.22	32.588	25.22	6.59	0.589	-0.023		104	
1	27	9.24	32.577	25.21	6.59	0.589	-0.023		104	
1	45	9.23	32.555	25.19	6.57	0.587	-0.020		104	
1	67	9.25	32.602	25.23	6.60	0.589	-0.024		104	
1	89	9.24	32.516	25.16	6.59	0.589	-0.023		104	
1	111	8.58	32.613	25.34	6.30	0.563	0.012		98	
1	133	6.32	33.112	26.04	5.74	0.513	0.091		85	
2	139	6.22	33.342	26.24	5.43	0.485	0.119		80	
2	159	6.42	33.669	26.47	4.75	0.424	0.176		71	
2	245	6.02	33.900	26.70	3.47	0.310	0.295		51	
2	418	4.58	34.029	26.98	1.30	0.116	0.510		19	
2	639	3.94	34.172	27.15	0.54	0.048	0.589		8	
2	862	3.37	34.290	27.31	0.43	0.038	0.606		6	
2	1312	2.66	34.544	27.57	0.47	0.042	0.613		6	
2	1582	2.33	34.587	27.64	0.84	0.075	0.586		11	

CNAV OSHAWA CRUISE OSI STATION G11 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.22	2.68		32.501
8	0.23	2.80		32.503
27	0.22	0.84		32.499
54	0.20	0.08		32.502

11.68 69.12 - WATER COLUMN VALUES

MESSENGER TIME 1216 INCOMING SOLAR RADIATION - AM 149 PM 150
 SURFACE TEMPERATURE ASSUMED FOR PURPOSES OF INTERPOLATION.

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION OII		INTERPOLATED AND COMPUTED VALUES							VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)				
0	9.20*		32.506	0.000	25.16	281.6	0.000	0.00	6.59	0.00				
10	9.28	0.01	32.545	0.002	25.18	280.1	0.029	0.01	6.62	0.00	0.93			
20	9.22	0.00	32.588	0.002	25.22	276.2	0.057	0.06	6.59	0.00	0.75			
30	9.24	0.00	32.571	0.001	25.20	277.9	0.085	0.13	6.59	0.00	0.93			
50	9.23	0.00	32.568	0.006	25.20	278.4	0.141	0.36	6.58	0.00	0.78			
75	9.29	0.02	32.568	0.012	25.19	279.6	0.211	0.81	6.61	0.01	0.67			
100	9.05	0.04	32.528	0.009	25.20	279.4	0.281	1.44	6.48	0.00	0.64			
150	6.19	0.10	33.507	0.018	26.37	168.2	0.394	2.82	5.09	0.03	0.59			
200	6.37	0.08	33.905	0.075	26.66	141.4	0.472	4.21	3.97	0.11	1.42			
250	5.98	0.01	33.907	0.002	26.71	137.0	0.542	5.83	3.39	0.00	0.99			
300	5.56	0.06	33.966	0.016	26.81	128.1	0.609	7.71	2.68	0.03	0.86			
400	4.73	0.03	34.026	0.007	26.96	114.9	0.732	12.08	1.48	0.01	0.85			
500	4.26	0.05	34.085	0.000	27.05	106.2	0.843	17.22	0.85	0.06	0.71			
600	4.00	0.03	34.149	0.000	27.13	99.4	0.947	23.08	0.57	0.04	0.79			
700	3.77	0.00	34.205	0.001	27.20	93.5	1.045	29.58	0.47	0.02	0.71			
800	3.52	0.00	34.258	0.001	27.27	87.5	1.136	36.62	0.42	0.02	0.64			
1000	3.11	0.01	34.379	0.009	27.40	75.5	1.301	51.77	0.39	0.01	0.91			
1200	2.80	0.01	34.490	0.008	27.52	65.0	1.443	67.78	0.41	0.01	0.88			
1500	2.43	0.00	34.571	0.008	27.61	56.6	1.628	93.32	0.69	0.00	7.38			

CNAV OSHAWA CRUISE OSI STATION 012 OBSERVED VALUES

DATE 16/03/63 HR 03.4 LAT 46-06 N LONG 130-00 W WEA 02 WIND VEL 25 DIR 31
 BAROM 96. TEMP DRY 5.6 WET 5.6 RELHU 99 WTRCLR SEA 3 DIR 34 SWELL 7 DIR 28
 CLOUD TYPE AMT 8 VIS 6 WIRE ANGLE(S) 15.12.18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0		32.543		6.65	0.594			
1	5	9.45	32.546	25.15	6.52	0.582	-0.019		103
1	10	9.50	32.584	25.17	6.56	0.586	-0.023		104
1	19	9.47	32.544	25.14	6.49	0.580	-0.017		103
1	29	9.50	32.617	25.20	6.48	0.579	-0.016		103
1	48	9.46	32.546	25.15	6.50	0.581	-0.017		103
1	72	9.48	32.581	25.17	6.54	0.584	-0.021		104
2	98	8.02	32.785	25.56	6.08	0.543	0.038		93
2	122	6.84	33.147	26.00	5.82	0.520	0.076		87
2	147	6.75	33.450	26.25	5.13	0.458	0.138		77
3	168	7.04	33.739	26.44	4.27	0.381	0.209		65
3	191	6.90	33.850	26.55	3.88	0.347	0.246		59
3	288	5.66	33.922	26.77	2.88	0.257	0.353		42
3	482	4.61	34.062	27.00	0.96	0.086	0.540		14
3	725	3.87	34.248	27.22	0.37	0.033	0.604		5

CNAV OSHAWA CRUISE OSI STATION 012 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY
 LAB-I DECK-I

0 0.21
 8 0.21
 27 0.19
 54 0.19

10.56 - WATER COLUMN VALUES

MESSANGER TIME 1927 INCOMING SOLAR RADIATION - AM 149 PM 150

CNAV OSHAWA CRUISE 051 STATION 013 OBSERVED VALUES

DATE 16/03/63 HR 11-2 LAT 45-14 N LONG 130-00 W WEA 90 WIND VEL 37 DIR 34
 BAROM 00- TEMP DRY 6-1 WET 5-6 REL HU 93 WTR CLR SECD1 SEA 3 DIR 34 SWELL 7 DIR 30
 CLOUD TYPE VIS 5 WIRE ANGLE(S) 20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	UXY GEN	ADP	SATN
1	0	9.74	32.575	25.13	6.44	0.575	-0.015	103	
1	5	9.71	32.572	25.13	6.46	0.577	-0.015	103	
1	9	9.75	32.583	25.13	6.43	0.574	-0.015	103	
1	19	9.75	32.596	25.12	6.35	0.567	-0.008	101	
1	28	9.77	32.575	25.12	6.35	0.567	-0.008	101	
1	47	9.74	32.575	25.13	6.39	0.563	-0.003	101	
1	71	9.79	32.574	25.12	6.39	0.571	-0.012	102	
1	94	9.78	32.578	25.12	6.39	0.571	-0.012	102	
1	117	8.20	32.756	25.51	5.97	0.533	0.056	92	
1	141	7.02	33.067	25.92	5.64	0.504	0.050	85	

CNAV OSHAWA CRUISE 051 STATION 013 INTERPRETED AND COMPUTED VALUES

DEPTH	TEMP	ECT	SAL	EIS	SIGMA-T	SP. O. ANCHOR	GEOPOT ANOMAL	POI ENERGY	UXY ML/L	EIO	VAR RATIO
0	9.74	0.00	32.575	0.000	25.13	284.8	0.000	0.00	6.44	0.00	
10	9.75	0.00	32.584	0.001	25.13	284.5	0.029	0.02	6.42	0.00	1.12
20	9.75	0.00	32.584	0.004	25.13	284.7	0.058	0.06	6.35	0.00	1.47
30	9.77	0.00	32.575	0.000	25.12	285.8	0.087	0.13	6.34	0.00	0.96
50	9.75	0.00	32.575	0.000	25.12	285.8	0.144	0.37	6.31	0.00	0.86
75	9.85	0.04	32.568	0.004	25.10	288.3	0.216	0.83	6.41	0.01	0.78
100	9.42	0.06	32.610	0.002	25.20	279.0	0.288	1.47	6.30	0.02	0.72

CNAV OSHAWA CRUISE OSI STATION 13A BIOLOGICAL DATA

DATE 16/03/63 LAT 44-40 N LONG 130-02 W

DEPTH	CHL-A	PRODUCTIVITY LAB-1	DECK-1	SAL
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0	0.25	3.84		32.531
0		4.74		

MESSENGER TIME 0645 INCOMING SOLAR RADIATION - AM 200 PM 241
THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
INTENSITY INSTEAD OF 100 PERCENT

CNAV OSHAWA CRUISE OSI STATION 014 OBSERVED VALUES

DATE 16/03/63 HR 17.8 LAT 44-14 N LONG 130-00 W WEA 02 WIND VEL 25 DIR 32
 BAROM 04. TEMP DRY 8.9 WET 8.9 RELHU 99 WTRCLR SEA 4 DIR 32 SWELL 4 DIR 30
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 13.24

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.90	32.556	25.08	6.54	0.584	-0.027		105
1	5	9.98	32.552	25.07	6.48	0.579	-0.022		104
1	10	9.61	32.554	25.13	6.46	0.577	-0.016		103
1	19	9.60	32.574	25.15	6.46	0.577	-0.016		103
1	29	9.61	32.567	25.14	6.47	0.578	-0.017		103
1	49	9.59	32.556	25.13	6.49	0.580	-0.018		103
1	73	9.61	32.556	25.13	6.44	0.575	-0.014		103
1	97	9.52	32.563	25.15	6.43	0.574	-0.012		102
1	122	7.98	32.938	25.68	5.69	0.508	0.073		87
1	146	7.45	33.428	26.14	5.09	0.455	0.132		78
2	165	7.52	33.765	26.40	4.71	0.421	0.163		72
2	188	7.58			4.40	0.393			
2	283	6.28	33.920	26.69	3.12	0.279	0.322		46
2	478	4.78	34.029	26.95	1.19	0.106	0.517		17
2	722	3.95	34.242	27.21	0.41	0.037	0.599		6
2	968	3.40	34.410	27.40	0.26	0.023	0.621		4
2	1462	2.58	34.527	27.57	0.76	0.068	0.589		10
2	1759	2.12	34.556	27.63	1.19	0.106	0.558		16

CNAV OSHAWA CRUISE OS1 STATION 014 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.20	12.18		32.561
7	0.20	3.30		32.569
24	0.22	0.94		32.569
51	0.22	0.02		32.567

10.85 103.16 - WATER COLUMN VALUES

MESSSENGER TIME 0948 INCOMING SOLAR RADIATION - AM 200 PM 241

CNAV OSHAWA				CRUISE OS1		STATION 014		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0 10 20 30	9.90	0.00	32.556	0.000	25.08	288.7	0.000	0.00	6.54	0.00	0.88 0.98		
	9.61	0.00	32.554	0.000	25.13	284.5	0.029	0.02	6.46	0.00			
	9.60	0.00	32.574	0.000	25.15	283.1	0.058	0.06	6.46	0.00			
	9.61	0.00	32.566	0.000	25.14	283.9	0.087	0.13	6.47	0.00			
50 75 100 150	9.59	0.00	32.556	0.000	25.13	284.8	0.144	0.37	6.49	0.00	0.95		
	9.63	0.02	32.550	0.004	25.12	286.3	0.216	0.83	6.45	0.01	0.89		
	9.35	0.04	32.594	0.004	25.20	279.1	0.287	1.47	6.36	0.02	0.85		
	7.45	0.01	33.504	0.001	26.20	184.8	0.404	2.91	5.00	0.00	0.75		
200 250 300 400	7.47	0.05	33.989	0.114	26.58	150.0	0.488	4.40	4.23	0.00	2.11		
	6.85	0.11	34.048	0.110	26.71	137.8	0.561	6.07	3.55	0.01	1.53		
	6.10	0.01	33.932	0.003	26.72	137.4	0.630	8.03	2.91	0.00	0.97		
	5.24	0.03	33.993	0.010	26.87	123.4	0.762	12.73	1.84	0.01	0.76		
500 600 700 800	4.68	0.01	34.047	0.002	26.98	113.7	0.881	18.24	1.07	0.02	0.90		
	4.27	0.04	34.133	0.005	27.09	103.7	0.991	24.42	0.65	0.05	0.67		
	4.00	0.01	34.222	0.002	27.19	94.8	1.091	31.11	0.43	0.02	0.88		
	3.75	0.01	34.302	0.001	27.28	87.0	1.183	38.18	0.31	0.01	0.68		
1000 1200 1500	3.34	0.00	34.423	0.002	27.42	74.8	1.347	53.21	0.27	0.01	0.97		
	2.99	0.01	34.489	0.009	27.50	67.3	1.491	69.44	0.41	0.03	0.89		
	2.52	0.00	34.530	0.001	27.57	60.7	1.686	96.37	0.82	0.01	0.99		

CNAV OSHAWA CRUISE OSI STATION 015 OBSERVED VALUES									
DATE 17/03/63		HR 01.5	LAT 43-12 N	LONG 130-00 W	SEA 02	WIND VEL 32 DIR 36	SEA 4 DIR 36	SWELL 7 DIR 32	
BAROM 07.5		TEMP DRY 7.8	WET 5.6	RELHU 72	WIRCLR	SECDI			
CLOUD TYPE		VIS 7	WIRE ANGLE(S)	5,10,10,18					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN	
1	0	10.84	32.742	25.07	6.41	0.573	-0.027	105	
1	10	10.86	32.747	25.07	6.29	0.562	-0.017	103	
2	20	10.87	32.790	25.10	6.37	0.569	-0.024	104	
2	29	10.86	32.748	25.07	6.29	0.562	-0.017	103	
2	49	10.86	32.768	25.09	6.29	0.562	-0.017	103	
2	74	10.78	32.785	25.11	6.08	0.543	0.003	100	
2	99	9.36	33.223	25.69	4.84	0.432	0.129	77	
3	123	8.54	33.644	26.15	4.01	0.358	0.213	63	
3	148	8.14	33.823	26.35	3.35	0.299	0.276	52	
3	172	7.70	33.903	26.48	3.25	0.290	0.291	50	
4	191	7.50							
4	287	6.32	34.023	26.76	1.80	0.161	0.439	27	
4	481	5.06	34.140	27.01	0.73	0.065	0.553	11	
4	725	4.32	34.316	27.23	0.30	0.027	0.602	4	
4	968	3.56	34.386	27.36	0.29	0.026	0.615	4	
4	1456	2.56	34.535	27.58	0.72	0.064	0.593	10	
4	1751	2.13	34.624*	27.68	1.26	0.113	0.551	17	
4	2045	1.89	34.614	27.69	1.56	0.139	0.529	21	
4	2340	1.82	34.630	27.71	1.72	0.154	0.516	23	
4	2636	1.75	34.640	27.72	1.83	0.163	0.507	24	
4	3127	1.61	34.657	27.75	2.35	0.210	0.463	31	

	CNAV OSHAWA	CRUISE 051	STATION 015	BIOLOGICAL DATA
DEPTH	CHL-A	PRODUCTIVITY		
		LAB-I	DECK-I	

0	0.59
7	0.64
24	0.67
51	0.71

34.14 - WATER COLUMN VALUES

MESSENGER TIME 1732 INCOMING SOLAR RADIATION - AM 200 PM 241

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 015		INTERPOLATED AND COMPUTED VALUES							VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VUL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)				
0	10.84	0.00	32.742	0.000	25.07	290.1	0.000	0.00	6.41	0.00	0.99			
10	10.86	0.00	32.747	0.000	25.10	290.3	0.030	0.02	6.29	0.00				
20	10.87	0.00	32.790	0.000	25.10	287.5	0.059	0.06	6.37	0.00				
30	10.86	0.00	32.747	0.001	25.07	290.7	0.088	0.14	6.29	0.00				
50	10.87	0.01	32.765	0.003	25.08	290.0	0.146	0.38	6.29	0.01	0.95			
75	10.73	0.01	32.798	0.003	25.13	285.7	0.219	0.84	6.04	0.01				
100	9.32	0.00	33.243	0.001	25.71	230.5	0.284	1.42	4.80	0.00				
150	8.10	0.00	33.832	0.001	26.36	169.6	0.385	2.67	3.33	0.01				
200	7.39	0.01	33.954	0.012	26.56	151.3	0.466	4.11	2.94	0.07	1.54			
250	6.77	0.03	34.010	0.014	26.69	139.5	0.539	5.80	2.32	0.08				
300	6.20	0.01	34.032	0.001	26.78	131.2	0.607	7.72	1.69	0.01				
400	5.46	0.04	34.096	0.005	26.93	118.3	0.733	12.22	1.03	0.04				
500	4.99	0.01	34.155	0.001	27.03	109.3	0.848	17.51	0.67	0.01	0.91			
600	4.64	0.04	34.230	0.006	27.13	100.7	0.954	23.49	0.43	0.02				
700	4.37	0.01	34.300	0.002	27.21	93.4	1.052	30.02	0.31	0.01				
800	4.08	0.01	34.343	0.004	27.28	87.6	1.144	37.07	0.27	0.01				
1000	3.48	0.00	34.397	0.001	27.38	78.3	1.312	52.52	0.30	0.00	0.97			
1200	3.02	0.01	34.461	0.003	27.48	69.7	1.461	69.41	0.42	0.00				
1500	2.49	0.00	34.544	0.000	27.59	59.2	1.657	96.43	0.80	0.01				
2000	1.92	0.00	34.611	0.000	27.69	49.8	1.934	145.80	1.53	0.00				
2500	1.78	0.00	34.636	0.000	27.72	48.2	2.184	203.68	1.77	0.01	0.60			
3000	1.65	0.00	34.652	0.000	27.74	46.9	2.427	272.66	2.14	0.01				

CNAV OSHAWA CRUISE OSI STATION 016 OBSERVED VALUES

DATE 17/03/63 HR 07.9 LAT 43-14 N LONG 129-25 W WEA 03 WIND VEL 20 DIR 36
 BAROM 11. TEMP DRY 7.8 WET 6.7 RELHU 86 WTRCLR SECDI SEA 3 DIR 35 SWELL 5 DIR 32
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 0.20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					ML/L	MGA/L		
1	0	10.74	32.692	25.05	6.41	0.573	-0.027	105
1	5		32.700		6.29	0.562		
1	10	10.72	32.708	25.06	6.33	0.565	-0.019	103
1	20	10.73	32.715	25.07	6.24	0.557	-0.011	102
1	30	10.74	32.701	25.05	6.29	0.562	-0.015	103
1	50	10.72	32.702	25.06	6.29	0.562	-0.015	103
1	75	10.81	32.765	25.09	6.29	0.562	-0.016	103
1	100	9.32	33.397	25.83	4.36	0.389	0.172	69
1	125	8.65	33.630	26.12	3.80	0.339	0.230	60
1	150	8.01	33.849	26.39	3.27	0.292	0.285	51
2	164	7.95	33.864	26.41	3.24	0.289	0.288	50
2	185	7.74	33.903	26.47	3.23	0.288	0.292	50
2	279	6.41	33.931	26.68	3.23	0.288	0.311	48
2	468	5.25	34.103	26.96	0.97	0.087	0.525	14
2	706	4.40	34.381*	27.27	0.33	0.029	0.598	5
2	945	3.72	34.401	27.36	0.34	0.030	0.608	5
2	1424	2.68	34.511	27.55	0.60	0.054	0.602	8
2	1712	2.25	34.630	27.68	1.07	0.096	0.566	14

DEPTH	CNAV OSHAWA		CRUISE OSL		STATION 016		INTERPOLATED AND COMPUTED VALUES						VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)			
0 10 20 30	10.74	0.00	32.692	0.000	25.05	292.2	0.000	0.00	6.41	0.00	1.33 1.15 0.96 0.75		
	10.72	0.00	32.708	0.000	25.06	290.9	0.030	0.02	6.33	0.00			
	10.73	0.00	32.715	0.000	25.07	290.7	0.059	0.06	6.24	0.00			
	10.74	0.00	32.701	0.000	25.05	292.1	0.089	0.14	6.29	0.00			
50 75 100 150	10.72	0.00	32.702	0.000	25.06	292.1	0.147	0.38	6.29	0.00	1.00 0.99 0.96 0.83		
	10.81	0.00	32.765	0.000	25.09	289.5	0.221	0.85	6.29	0.00			
	9.32	0.00	33.397	0.000	25.83	219.2	0.285	1.41	4.36	0.00			
	8.01	0.00	33.849	0.000	26.39	167.1	0.382	2.63	3.27	0.00			
200 250 300 400	7.53	0.03	33.914	0.006	26.51	156.3	0.464	4.09	3.25	0.02	1.15 0.96 0.75		
	6.83	0.04	33.933	0.010	26.62	146.0	0.540	5.84	3.27	0.03			
	6.22	0.03	33.947	0.003	26.71	137.7	0.611	7.86	3.02	0.08			
	5.53	0.06	34.034	0.007	26.87	123.8	0.743	12.57	1.87	0.18			
500 600 700 800	5.11	0.01	34.129	0.000	26.99	112.8	0.863	18.07	0.79	0.04	1.00 0.99 0.96 0.83		
	4.73	0.02	34.205	0.000	27.10	103.7	0.972	24.23	0.42	0.07			
	4.42	0.00	34.272	0.000	27.19	96.0	1.073	30.95	0.33	0.01			
	4.12	0.00	34.331	0.000	27.26	89.0	1.166	38.15	0.29	0.02			
1000 1200 1500	3.58	0.00	34.416	0.005	27.39	78.1	1.336	53.70	0.35	0.01	0.95 0.88 0.94		
	3.11	0.00	34.465	0.012	27.47	70.6	1.486	70.68	0.42	0.01			
	2.55	0.00	34.534	0.003	27.57	60.7	1.686	98.23	0.69	0.00			

CNAV OSHAWA				CRUISE OSI				STATION 017				OBSERVED VALUES			
DATE 17/03/63		HR 12.4	LAT 43-14 N	LONG 128-40 W	SEA 01		WIND VEL 23 DIR 36		SEA 3		DIR 35		SWELL 5 DIR 32		
BAROM 12	TEMP DRY 9-4	WET 7-8	RELHU 81	WTRCLR	SNDG		SECDI		WEA 01		WIND VEL 23 DIR 36		SEA 3		
CLOUD TYPE	AMT 3	VIS 7	WIRE ANGLE(S) 10,25	WTRCLR	SNDG		SECDI		WEA 01		WIND VEL 23 DIR 36		SEA 3		
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN							
1	0	10.72	32.758	25.10	6.33	0.565	-0.019	103							
1	5	10.77	32.750	25.09	6.31	0.564	-0.018	103							
1	10	10.78	32.784	25.11	6.32	0.564	-0.019	103							
1	20	10.78	32.748	25.08	6.33	0.565	-0.019	104							
1	29	10.79	32.776	25.10	6.28	0.561	-0.015	103							
1	49	10.80	32.822	25.14	6.31	0.564	-0.018	103							
1	74	10.82	32.790	25.11	6.27	0.560	-0.015	103							
1	99	9.50	33.101	25.57	5.14	0.459	0.101	82							
1	123	8.82	33.450	25.95	4.36	0.389	0.178	69							
1	148	8.42	33.714	26.22	3.55	0.317	0.255	55							
2	158	8.28	33.800	26.31	3.31	0.296	0.278	52							
2	181	7.96	33.929	26.46	2.84	0.254	0.324	44							
2	271	7.08	34.033	26.67	2.01	0.180	0.410	30							
2	457	5.62	34.112	26.92	1.09	0.097	0.513	16							
2	693	4.52	34.250	27.16	0.45	0.040	0.586	6							
2	929	3.88	34.375	27.32	0.31	0.028	0.608	4							
2	1404	2.78	34.497	27.53	0.56	0.050	0.604	8							
2	1691	2.34	34.560	27.61	1.00	0.089	0.572	14							

CNAV OSHAWA CRUISE OSI STATION 017 BIOLOGICAL DATA

DEPTH CML-A PRODUCTIVITY SAL
LAB-I DECK-I
0 0-59 8-42 32-745
0 12-22

MESSENGER TIME 0620 INCOMING SOLAR RADIATION - AM 214 PM 166

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
INTENSITY INSTEAD OF 100 PERCENT

DEPTH	TEMP	E(T)	CNAV OSHAWA	CRUISE OSI	STATION 017	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10-72	0-00	32-758	0-000	25-10	287-0	0-000	0-000	0-00	6-33	0-00	
10	10-78	0-00	32-784	0-000	25-11	286-3	0-029	0-029	0-02	6-32	0-00	
20	10-78	0-00	32-748	0-000	25-08	289-1	0-058	0-058	0-06	6-33	0-00	
30	10-79	0-00	32-779	0-000	25-11	287-2	0-087	0-087	0-13	6-28	0-00	0-99
50	10-81	0-01	32-818	0-003	25-13	285-1	0-145	0-145	0-37	6-32	0-01	0-95
75	10-77	0-01	32-799	0-002	25-12	286-4	0-217	0-217	0-83	6-23	0-01	0-94
100	9-46	0-00	33-116	0-001	25-59	242-3	0-284	0-284	1-42	5-10	0-00	0-94
150	8-39	0-00	33-734	0-002	26-24	181-2	0-390	0-390	2-76	3-50	0-01	0-62
200	7-74	0-01	33-979	0-017	26-53	154-5	0-475	0-475	4-26	2-59	0-04	1-28
250	7-25	0-01	34-039	0-018	26-65	143-9	0-550	0-550	5-99	2-12	0-04	0-93
300	6-82	0-00	34-050	0-005	26-72	137-9	0-621	0-621	8-00	1-82	0-02	0-94
400	6-01	0-00	34-096	0-007	26-86	125-3	0-754	0-754	12-74	1-30	0-02	0-75
500	5-37	0-01	34-136	0-001	26-97	115-5	0-876	0-876	18-34	0-93	0-00	0-82
600	4-88	0-02	34-194	0-002	27-07	106-3	0-988	0-988	24-65	0-64	0-00	0-68
700	4-50	0-00	34-254	0-000	27-16	98-3	1-091	1-091	31-54	0-44	0-00	0-96
800	4-20	0-02	34-310	0-001	27-24	91-5	1-187	1-187	38-92	0-34	0-01	0-61
1000	3-69	0-00	34-399	0-003	27-36	80-6	1-361	1-361	54-94	0-31	0-00	0-94
1200	3-21	0-01	34-457	0-006	27-45	72-3	1-516	1-516	72-39	0-37	0-00	0-88
1500	2-61	0-00	34-515	0-002	27-56	62-8	1-721	1-721	100-74	0-69	0-00	0-90

CNAV OSHAWA CRUISE 051 STATION 018 OBSERVED VALUES									
DATE 17/03/63		HR 17.8	LAT 43-14 N	LONG 128-06 W	SEA 02	WIND VEL 12 DIR 32			
BAROM 16.		TEMP DRY 10.0	WET 9.4	RELHU 93	WTRCLR	SEA 2 DIR 32	SWELL 3 DIR 34		
CLOUD TYPE		AMT 4	VIS 7	WIRE ANGLE(S) 15.20					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	AOU	SECDI	SATN
1	0	10.40	32.652	25.07	6.47	0.578	-0.027	105	
1	5	10.35	32.627	25.06	6.40	0.572	-0.020	104	
1	10	10.35	32.644	25.08	6.50	0.581	-0.029	105	
1	19	10.41	32.668	25.09	6.40	0.572	-0.021	104	
1	29	10.36	32.635	25.07	6.42	0.573	-0.022	104	
1	48	10.37	32.625	25.06	6.48	0.579	-0.027	105	
1	73	10.40	32.629	25.06	6.41	0.573	-0.022	104	
1	96	9.16	32.977	25.53	5.52	0.493	0.072	87	
1	121	8.73	33.508	26.01	4.11	0.367	0.202	65	
1	145	8.34	33.746	26.26	3.47	0.310	0.263	54	
2	165	8.18	33.836	26.35	3.17	0.283	0.292	49	
2	189	7.92	33.897	26.44	2.97	0.265	0.313	46	
2	283	6.94	34.010	26.67	2.16	0.193	0.398	33	
2	472	5.47	34.101	26.93	0.94	0.084	0.528	14	
2	709	4.32	34.239	27.17	0.36	0.032	0.597	5	
2	946	3.75	34.398	27.35	0.28	0.025	0.613	4	
2	1423	2.78	34.515	27.54	0.71	0.063	0.590	10	
2	1710	2.32	34.572	27.62	1.09	0.097	0.565	15	

CNAV OSHAWA CRUISE OSI STATION 018 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.78	12.52		32.625
4	0.87	13.92		32.627
20	0.88	2.96		32.624
44	0.96	0.00		32.631

39.42 223.44 - WATER COLUMN VALUES

MESSANGER TIME 0950 INCOMING SOLAR RADIATION - AM 214 PM 166

INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	CNAV OSHAWA	CRUISE OSI	STATION 018	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.40	0.00	32.652	0.000	25.07	283.6	0.000	0.000	0.00	0.00	0.00	6.47	0.00	
10	10.35	0.00	32.644	0.000	25.08	289.5	0.030	0.030	0.02	0.02	0.00	6.50	0.00	0.88
20	10.41	0.00	32.666	0.001	25.08	289.0	0.059	0.059	0.06	0.06	0.00	6.40	0.00	0.97
30	10.36	0.00	32.633	0.000	25.07	290.8	0.088	0.088	0.14	0.14	0.00	6.42	0.00	
50	10.40	0.02	32.618	0.005	25.05	293.0	0.147	0.147	0.38	0.38	0.01	6.49	0.01	0.91
75	10.30	0.03	32.650	0.003	25.09	289.5	0.220	0.220	0.85	0.85	0.01	6.36	0.01	0.88
100	9.06	0.02	33.066	0.010	25.62	239.7	0.287	0.287	1.44	1.44	0.03	5.28	0.03	0.81
150	8.30	0.01	33.775	0.002	26.29	176.7	0.392	0.392	2.74	2.74	0.00	3.38	0.00	0.70
200	7.80	0.00	33.917	0.003	26.47	159.9	0.477	0.477	4.26	4.26	0.00	2.87	0.00	1.18
250	7.27	0.00	33.984	0.006	26.60	148.2	0.554	0.554	6.05	6.05	0.01	2.44	0.01	1.08
300	6.78	0.00	34.022	0.003	26.70	139.6	0.627	0.627	8.09	8.09	0.00	2.03	0.00	0.96
400	5.96	0.01	34.076	0.008	26.85	126.1	0.761	0.761	12.88	12.88	0.00	1.33	0.00	0.75
500	5.30	0.00	34.116	0.000	26.96	116.0	0.883	0.883	18.51	18.51	0.01	0.83	0.01	0.87
600	4.76	0.01	34.173	0.000	27.07	106.5	0.995	0.995	24.84	24.84	0.02	0.53	0.02	0.67
700	4.35	0.00	34.233	0.000	27.16	98.0	1.099	1.099	31.72	31.72	0.00	0.37	0.00	0.94
800	4.06	0.02	34.303	0.003	27.25	90.4	1.194	1.194	39.05	39.05	0.01	0.29	0.01	0.63
1000	3.63	0.00	34.419	0.004	27.38	78.4	1.365	1.365	54.75	54.75	0.01	0.30	0.01	0.95
1200	3.20	0.00	34.479	0.010	27.47	70.5	1.516	1.516	71.75	71.75	0.02	0.44	0.02	0.89
1500	2.65	0.00	34.526	0.002	27.56	62.4	1.718	1.718	99.67	99.67	0.00	0.81	0.00	1.08

CNAV OSHAWA CRUISE OSI STATION 019 OBSERVED VALUES
 DATE 17/03/63 HR 21.7 LAT 43-14 N LONG 127-42 W WEA 02 WIND VEL 13 DIR 29
 BAROM 18.0 TEMP DRY 12.8 WET 11.7 RELHU 88 WTRCLR SECDI SEA 2 DIR 35 SWELL 3 DIR 20
 CLOUD TYPE 8 AMT 4 VIS 7 WIRE ANGLE(S) 5.16
 CST DEPTH TEMP SAL SIGMA-T ML/L MGA/L OXYGEN AUO SATN
 1 1 0 10.45 32.644 25.06 6.51 0.581 -0.031 106
 1 1 5 10.42 32.605 25.03 6.54 0.584 -0.033 106
 1 1 10 10.33 32.610 25.05 6.44 0.575 -0.023 104
 1 1 20 10.30 32.618 25.07 6.54 0.584 -0.032 106
 1 1 30 10.30 32.627 25.07 6.39 0.571 -0.019 103
 1 1 50 10.22 32.622 25.08 6.46 0.577 -0.024 104
 1 1 75 10.33 32.620 25.06 6.39 0.571 -0.019 103
 1 1 100 9.19 32.883 25.45 5.52 0.493 0.072 87
 1 1 124 8.59 33.353 25.91 4.56 0.407 0.164 71
 1 1 149 8.16 33.633 26.20 3.91 0.349 0.227 61
 2 2 168 7.86 33.764 26.35 3.56 0.318 0.261 55
 2 2 191 7.42 33.869 26.49 3.42 0.305 0.280 52
 2 2 286 6.35 33.958 26.71 2.68 0.239 0.360 40
 2 2 480 5.09 34.109 26.98 0.87 0.078 0.540 13
 2 2 729 4.20 34.294 27.23 0.63 0.056 0.575 9
 2 2 971 3.66 34.456 27.41 0.29 0.026 0.613 4
 2 2 1466 2.58 34.520 27.56 0.69 0.062 0.595 9
 2 2 1764 2.11 34.582 27.65 1.25 0.112 0.553 17

CNAV OSHAWA CRUISE 051 STATION 019 BIOLOGICAL DATA
 DEPTH CHL-A PRODUCTIVITY
 LAB-I DECK-I

0 0.92
 4 0.95
 20 1.18
 44 0.88

45.45 - WATER COLUMN VALUES

MESSSENGER TIME 1342 INCOMING SOLAR RADIATION - AM 214 PM 166

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.45	0.00	32.644	0.000	25.06	291.0	0.000	0.00	6.51	0.00	0.92
10	10.33	0.00	32.610	0.000	25.05	291.7	0.030	0.02	6.44	0.00	1.17
20	10.30	0.00	32.618	0.000	25.07	290.9	0.059	0.06	6.54	0.00	1.18
30	10.30	0.00	32.627	0.000	25.07	290.4	0.088	0.14	6.39	0.00	0.97
50	10.22	0.00	32.622	0.000	25.08	289.9	0.147	0.38	6.46	0.00	0.76
75	10.33	0.00	32.620	0.000	25.06	292.3	0.220	0.85	6.39	0.00	1.17
100	9.19	0.00	32.883	0.000	25.45	255.3	0.289	1.46	5.52	0.00	1.18
150	8.14	0.00	33.641	0.000	26.21	184.4	0.400	2.84	3.89	0.00	0.97
200	7.29	0.01	33.890	0.008	26.53	154.7	0.485	4.35	3.36	0.00	0.76
250	6.67	0.04	33.958	0.021	26.66	142.1	0.560	6.08	2.98	0.01	1.17
300	6.23	0.01	33.970	0.000	26.73	136.2	0.630	8.06	2.53	0.02	1.18
400	5.50	0.03	34.050	0.001	26.88	122.4	0.761	12.71	1.55	0.07	0.97
500	5.00	0.01	34.124	0.000	27.00	111.8	0.879	18.15	0.81	0.03	0.76
600	4.59	0.02	34.200	0.000	27.11	102.4	0.987	24.25	0.62	0.10	0.91
700	4.27	0.01	34.273	0.000	27.20	94.2	1.087	30.87	0.60	0.04	0.68
800	4.02	0.01	34.347	0.002	27.29	86.7	1.178	37.90	0.52	0.02	0.85
1000	3.59	0.00	34.464	0.004	27.42	74.7	1.341	52.91	0.28	0.01	0.69
1200	3.14	0.01	34.505	0.017	27.50	67.8	1.486	69.19	0.34	0.03	0.97
1500	2.52	0.00	34.522	0.003	27.57	61.2	1.682	96.33	0.75	0.01	0.99

CNAV OSHAWA CRUISE 051 STATION 020 OBSERVED VALUES									
DATE 18/03/63		HR 01.7	LAT 43-12 N	LONG 127-06 W	WEA 02	WIND VEL 15 DIR 30			
BAROM 18.0		TEMP DRY 10.6	WET 10.0	RELHU 93	SEA 2 DIR 30	SWELL 6 DIR 30			
CLOUD TYPE		VIS 8	WIRE 7	ANGLE(S) 5.21					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	ADU	SNDC	SECDI
1	0	10.42	32.678	25.09	6.56	0.586	-0.035	106	
1	5	10.42	32.675	25.09	6.55	0.585	-0.034	106	
1	10	10.42	32.664	25.08	6.60	0.589	-0.039	107	
2	14	10.28	32.690	25.12	6.51	0.581	-0.029	105	
1	20	10.27	32.648	25.09	6.54	0.584	-0.032	106	
1	30	10.26	32.709	25.14	6.51	0.581	-0.029	105	
2	38	10.24	32.655	25.10	6.36	0.568	-0.015	103	
1	50	10.28	32.662	25.10	6.52	0.582	-0.030	105	
1	75	9.53	33.040	25.52	5.19	0.464	0.097	83	
1	100	8.73	33.406	25.93	4.21	0.376	0.193	66	
1	124	8.41	33.695	26.21	3.60	0.322	0.251	56	
2	133	8.04	33.797	26.34	3.27	0.292	0.285	51	
1	149	7.91	33.853	26.41	3.11	0.278	0.301	48	
2	325	5.81	34.002	26.81	2.65	0.237	0.371	39	
2	569	4.68	34.190	27.09	0.58	0.052	0.572	8	
2	812	4.01	34.341	27.28	0.47	0.042	0.592	7	
2	1301	2.91	34.493	27.51	0.69	0.062	0.590	9	
2	1597	2.35	34.582	27.63	0.99	0.088	0.572	13	

CNAV OSHAWA CRUISE 051 STATION 020 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 0.79
4 0.79
20 1.14
44 1.03

44.70 - WATER COLUMN VALUES

MESSANGER TIME 1747 INCOMING SOLAR RADIATION - AM 214 PM 166

CNAV OSHAWA				CRUISE 051		STATION 020		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0 10 20 30	10.42	0.00	32.678	0.000	25.09	288.0	0.000	0.00	6.56	0.00	1.05		
	10.42	0.00	32.664	0.000	25.08	289.2	0.030	0.02	6.60	0.00			
	10.27	0.00	32.648	0.000	25.09	288.1	0.059	0.06	6.54	0.00			
	10.26	0.00	32.709	0.000	25.14	283.7	0.087	0.13	6.51	0.00			
50 75 100 150	10.28	0.00	32.662	0.000	25.10	287.9	0.145	0.37	6.52	0.00	4.39		
	9.53	0.00	33.040	0.000	25.52	248.5	0.213	0.80	5.19	0.00			
	8.73	0.00	33.406	0.000	25.93	209.6	0.270	1.31	4.21	0.00			
	7.90	0.00	33.855	0.001	26.41	165.0	0.365	2.49	3.11	0.00			
200 250 300 400	7.31	0.08	33.941	0.029	26.56	151.2	0.444	3.92	2.90	0.11	4.78		
	6.71	0.09	33.992	0.034	26.69	140.2	0.518	5.61	2.75	0.13			
	6.11	0.05	34.007	0.017	26.78	131.9	0.586	7.54	2.67	0.07			
	5.33	0.06	34.063	0.001	26.92	119.3	0.713	12.07	2.00	0.13			
500 600 700 800	4.87	0.05	34.140	0.001	27.03	109.2	0.828	17.37	1.15	0.12	0.73		
	4.58	0.01	34.212	0.000	27.12	101.4	0.935	23.37	0.51	0.03			
	4.29	0.02	34.277	0.001	27.20	94.1	1.034	29.95	0.39	0.07			
	4.04	0.00	34.335	0.000	27.28	87.8	1.125	37.03	0.45	0.01			
1000 1200 1500	3.55	0.00	34.412	0.008	27.39	78.1	1.293	52.48	0.50	0.01	0.90		
	3.11	0.00	34.470	0.005	27.47	70.2	1.444	69.41	0.61	0.01			
	2.53	0.00	34.548	0.004	27.59	59.4	1.641	96.58	0.88	0.00			

CNAV OSHAWA CRUISE 051 STATION 021 OBSERVED VALUES									
DATE 18/03/63		HR 06.0	LAT 43-14 N	LONG 126-32 W	SEA 02	WIND VEL 8 DIR 25	SEA 1 DIR 25	SWELL 2 DIR 27	
BAROM 20.0	TEMP DRY 10.0	WET 10.0	RELHU 99	WTRCLR	SNDG 2880	SECDI			
CLOUD TYPE	AMT 8	VIS 7	WIRE ANGLE(S)	8,24, 9					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.48	32.697	25.10	6.44	0.575	-0.025		105
1	5	10.47	32.700	25.10	6.47	0.578	-0.028		105
1	10	10.49	32.690	25.09	6.42	0.573	-0.024		104
1	20	10.41	32.726	25.13	6.48	0.579	-0.028		105
1	30	10.40	32.707	25.12	6.39	0.571	-0.020		104
1	49	10.40	32.717	25.13	6.37	0.569	-0.018		103
1	74	9.62	33.109	25.56	5.21	0.465	0.093		83
1	99	8.58	33.438	25.98	4.15	0.371	0.200		65
1	124	8.11	33.662	26.23	3.63	0.324	0.252		56
3	148	7.87	33.834	26.40	3.21	0.287	0.292		50
2	161	7.74	33.891	26.46	2.91	0.260	0.321		45
2	185	7.46	33.951	26.55	2.80	0.250	0.334		43
2	276	6.58	33.965	26.68	2.32	0.207	0.389		35
2	460	5.34	34.135	26.97	0.87	0.078	0.536		13
2	692	4.27	34.264	27.10	0.61	0.054	0.576		9
2	925	3.69	34.420	27.38	0.30	0.027	0.612		4
2	1392	2.74	34.527	27.55	0.65	0.058	0.596		9
2	1671	2.28	34.564	27.62	1.04	0.093	0.569		14
2	1952	1.98	34.601	27.68	1.43	0.128	0.539		19
2	2326	1.83	34.624	27.71	1.74	0.155	0.514		23
2	2607	1.79	34.631	27.71	1.91	0.171	0.500		25

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 021	INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.48	0.00	32.697	0.000	25.10	287.5	0.000	0.00	6.44	0.00	
10	10.49	0.00	32.690	0.000	25.09	288.4	0.030	0.02	6.42	0.00	
20	10.41	0.00	32.726	0.000	25.13	284.6	0.058	0.06	6.48	0.00	
30	10.40	0.00	32.707	0.000	25.12	286.1	0.087	0.13	6.39	0.00	
50	10.38	0.00	32.729	0.003	25.14	284.5	0.145	0.37	6.34	0.01	0.95
75	9.58	0.01	33.124	0.000	25.58	243.0	0.211	0.79	5.15	0.00	0.94
100	8.55	0.00	33.448	0.000	25.99	203.8	0.267	1.29	4.12	0.00	0.94
150	7.85	0.00	33.844	0.000	26.41	165.2	0.360	2.46	3.16	0.00	0.77
200	7.30	0.00	33.963	0.009	26.58	149.4	0.440	3.97	2.3	0.00	1.22
250	6.81	0.00	33.976	0.013	26.66	142.6	0.513	5.50	2.43	0.00	0.97
300	6.39	0.01	33.983	0.005	26.72	137.2	0.584	7.24	2.12	0.03	0.95
400	5.69	0.01	34.072	0.009	26.88	122.5	0.775	12.24	1.12	0.06	0.75
500	5.12	0.00	34.160	0.003	27.02	110.6	0.933	17.67	0.76	0.04	0.82
600	4.63	0.00	34.217	0.005	27.12	101.5	0.940	23.71	0.61	0.07	0.68
700	4.25	0.00	34.270	0.001	27.20	94.1	1.039	30.30	0.60	0.00	0.96
800	3.97	0.02	34.339	0.004	27.29	86.7	1.130	37.33	0.45	0.02	0.60
1000	3.52	0.00	34.448	0.005	27.42	75.0	1.294	52.36	0.30	0.02	0.93
1200	3.10	0.00	34.503	0.009	27.50	67.6	1.438	68.64	0.40	0.04	0.88
1500	2.55	0.00	34.543	0.001	27.58	60.1	1.633	95.47	0.79	0.01	0.61
2000	1.95	0.00	34.605	0.000	27.68	50.7	1.914	145.63	1.48	0.00	0.87
2500	1.80	0.00	34.629	0.000	27.71	49.0	2.168	204.53	1.85	0.00	0.76

CNAV OSHAWA CRUISE OSI STATION 022 OBSERVED VALUES									
DATE 18/03/63		HR 11-0	LAT 43-14 N	LONG 125-57 W	SEA 2 DIR 25	WIND VEL 18 DIR 27			
BAROM 20.		TEMP DRY 9.4	WET 9.4	RELHU 99	WTRCLR	SEA 2 DIR 25	WIND VEL 18 DIR 27		
CLOUD TYPE		AMT 8	VIS 6	WIRE ANGLE(S)	0.22	SEA 2 DIR 25	WIND VEL 18 DIR 27		
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.74	32.750	25.09	6.34	0.566	-0.020		104
1	5	10.75	32.752	25.09	6.34	0.566	-0.020		104
1	10	10.78	32.769	25.10	6.40	0.572	-0.026		105
1	20	10.78	32.769	25.10	6.32	0.564	-0.019		103
1	30	10.80	32.770	25.10	6.35	0.567	-0.022		104
1	50	10.46	32.740	25.13	6.35	0.567	-0.017		103
1	75	9.66	33.203	25.63	4.88	0.436	0.122		78
1	100	8.78	33.500	26.00	3.79	0.338	0.230		60
1	125	8.44	33.698	26.31					50
1	150	8.12	33.833	26.26	3.21	0.287	0.291		47
2	160	8.08	33.833	26.37	3.02	0.270	0.306		41
2	183	7.94	33.960	26.49	2.63	0.235	0.343		28
2	275	6.80	34.034	26.71	1.86	0.166	0.427		11
2	460	5.41	34.138	26.97	0.78	0.070	0.543		5
2	697	4.50	34.326	27.22	0.32	0.029	0.598		4
2	936	3.71	34.419	27.38	0.27	0.024	0.614		10
2	1419	2.67	34.530	27.56	0.71	0.063	0.592		15
2	1711	2.17	34.600	27.66	1.12	0.100	0.564		

DEPTH	CNAV OSHAWA		CRUISE 051		STATION 022		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0 10 20 30	10.74	0.00	32.750	0.000	25.09	287.9	0.000	0.00	6.34	0.00		
	10.78	0.00	32.769	0.000	25.10	287.4	0.029	0.02	6.40	0.00		
	10.78	0.00	32.769	0.000	25.10	287.6	0.058	0.06	6.32	0.00		
50	10.80	0.00	32.770	0.000	25.10	288.0	0.087	0.13	6.35	0.00		
50 75 100 150	10.46	0.00	32.740	0.000	25.13	285.0	0.145	0.37	6.35	0.00		
	9.66	0.00	33.203	0.000	25.63	238.4	0.211	0.79	4.88	0.00		
	8.78	0.00	33.500	0.000	26.00	203.4	0.267	1.28	3.79	0.00		
200	8.12	0.00	33.833	0.000	26.36	169.9	0.361	2.47	3.21	0.00		
200 250 300 400	7.75	0.03	34.000	0.017	26.55	153.0	0.442	3.92	2.43	0.03	1.28 0.99 0.94 0.74	
	7.14	0.04	34.049	0.022	26.67	141.7	0.516	5.63	2.00	0.04		
	6.56	0.01	34.049	0.002	26.75	134.6	0.586	7.59	1.68	0.00		
	5.76	0.02	34.105	0.004	26.90	121.4	0.715	12.21	1.06	0.00		
500 600 700 800	5.22	0.02	34.171	0.004	27.01	111.0	0.833	17.61	0.65	0.01	0.83 0.68 0.98 0.61	
	4.81	0.03	34.251	0.006	27.13	101.2	0.940	23.64	0.42	0.03		
	4.49	0.00	34.328	0.000	27.22	92.7	1.038	30.17	0.32	0.00		
	4.14	0.00	34.374	0.003	27.30	86.1	1.128	37.13	0.26	0.01		
1000 1200 1500	3.54	0.01	34.436	0.002	27.41	76.2	1.292	52.23	0.30	0.01	0.94 0.88 0.93	
	3.08	0.02	34.486	0.004	27.49	68.6	1.439	68.76	0.45	0.02		
	2.53	0.01	34.547	0.001	27.59	59.5	1.634	95.66	0.82	0.01		

CNAV OSHAWA CRUISE OS1 STATION 023 OBSERVED VALUES
 DATE 18/03/63 HR 14.2 LAT 43-12 N LONG 125-36 W WEA 02 WIND VEL 10 DIR 32
 BAROM 20.0 TEMP DRY 9.4 WET 9.4 RELHU 99 WTRCLR SECDI SMDG 2980
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 18.11 SEA 2 DIR 32 SWELL 3 DIR 32

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	10.85	32.768	25.09	6.39	0.571	-0.026	105
1	5	10.88	32.773	25.09	6.40	0.572	-0.027	105
1	10	10.90	32.786	25.09	6.43	0.574	-0.030	106
1	19	10.77	32.760	25.09	5.86	0.523	0.023	96
1	29	10.81	32.791	25.11	5.35	0.478	0.068	88
1	48	10.58	32.838	25.19	6.04	0.539	0.008	98
1	72	9.78	33.259	25.65	5.26	0.470	0.086	84
1	95	9.07	33.519	25.97	4.28	0.382	0.182	68
1	119	8.62	33.673	26.16	3.62	0.323	0.246	57
1	143	8.02	33.861	26.40	3.24	0.289	0.287	50
2	172	7.76	33.922	26.48	2.92	0.261	0.319	45
2	197	7.40	33.976	26.58	2.59	0.231	0.353	40
2	293	6.52	34.052	26.76	1.67	0.149	0.448	25
2	489	5.42	34.165	26.99	0.78	0.070	0.543	11
2	734	4.46	34.324	27.22	0.34	0.030	0.597	5
2	980	3.75	34.455	27.40	0.32	0.029	0.609	4
2	1472	2.63	34.518	27.56	0.76	0.068	0.588	10
2	1767	2.12	34.597	27.66	1.17	0.104	0.560	16

CNAV OSHAWA CRUISE OS1 STATION 023 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY SAL
 LAB-I DECK-I
 0 13.60 32.773

MESSENGER TIME 0625

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 023		INTERPOLATED AND COMPUTED VALUES							VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMLY	GEOPT ANOMLY	POT ENERGY	OXY ML/L	E(O)				
0 10 20 30	10.85	0.00	32.768	0.000	25.09	288.4	0.000	0.00	6.39	0.00	0.88 0.97			
	10.90	0.00	32.786	0.000	25.09	288.1	0.030	0.02	6.43	0.00				
	10.77	0.00	32.762	0.001	25.10	288.0	0.059	0.06	5.79	0.01				
	10.81	0.00	32.791	0.002	25.11	286.6	0.087	0.13	5.37	0.03				
50 75 100 150	10.52	0.01	32.868	0.007	25.22	276.6	0.144	0.37	6.01	0.02	0.91 0.83 0.77 0.77			
	9.68	0.00	33.300	0.001	25.70	231.5	0.208	0.77	5.13	0.01				
	8.97	0.01	33.555	0.004	26.01	202.2	0.263	1.26	4.12	0.00				
	7.94	0.02	33.884	0.006	26.43	163.5	0.355	2.41	3.16	0.01				
200 250 300 400	7.36	0.00	33.980	0.001	26.59	149.1	0.434	3.82	2.55	0.00	1.05 1.19 0.99 0.77			
	6.85	0.02	34.032	0.008	26.70	139.0	0.506	5.49	2.03	0.01				
	6.47	0.00	34.056	0.000	26.77	132.9	0.575	7.43	1.62	0.00				
	5.84	0.03	34.116	0.003	26.90	121.7	0.703	12.02	1.07	0.04				
500 600 700 800	5.37	0.00	34.172	0.000	27.00	112.8	0.822	17.47	0.75	0.00	0.95 0.68 0.82 0.71			
	4.94	0.01	34.238	0.002	27.10	103.8	0.931	23.63	0.51	0.01				
	4.57	0.00	34.302	0.001	27.19	95.6	1.032	30.34	0.37	0.01				
	4.25	0.01	34.364	0.001	27.28	88.2	1.125	37.49	0.31	0.01				
1000 1200 1500	3.70	0.00	34.459	0.002	27.41	76.3	1.291	52.78	0.33	0.00	0.98 0.89 0.99			
	3.20	0.00	34.494	0.014	27.48	69.4	1.439	69.42	0.46	0.01				
	2.58	0.00	34.521	0.002	27.56	61.9	1.638	97.04	0.80	0.00				

CNAV OSHAWA CRUISE OSI STATION 024 OBSERVED VALUES									
DATE 18/03/63	HR 17.7	LAT 43-14 N	LONG 125-13 W	SEA 01	WIND VEL 3 DIR 32				
BAROM 25.	TEMP DRY 11.1	WET 10.6	RELHU 94	WTRCLR	SEA 1 DIR 32	SWELL 2 DIR 30			
CLOUD TYPE	AMT 2	VIS 7	WIRE ANGLE(S)	0.18					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.39	32.685	25.10	6.65	0.594	-0.043		108
1	5	10.35	32.690	25.11	6.65	0.594	-0.043		108
1	10	10.29	32.686	25.12	6.52	0.582	-0.030		105
1	20	10.26	32.704	25.14	6.60	0.589	-0.037		107
1	30	10.29	32.714	25.14	6.61	0.590	-0.038		107
1	50	9.91	33.045	25.46	5.57	0.497	0.058		90
1	75	9.40	33.387	25.81	4.02	0.359	0.201		64
1	100	8.94	33.679	26.11	3.51	0.313	0.252		55
1	125	8.65	33.830	26.28	2.61	0.233	0.335		41
1	150	8.21	33.928	26.42	1.98	0.177	0.397		31
2	167	8.09	33.953	26.46	2.42	0.216	0.359		38
2	191	7.87	33.977	26.51	2.33	0.208	0.370		36
2	287	6.90	34.058	26.71	1.38	0.123	0.468		21
2	482	5.45	34.141	26.96	0.73	0.065	0.547		11
2	728	4.39	34.310	27.22	0.34	0.030	0.598		5
2	976	3.85	34.414	27.36	0.32	0.029	0.608		4
2	1273	3.03	34.526	27.53	0.55	0.049	0.600		8
2	1672	2.40	34.559	27.61	0.93	0.083	0.577		13

CNAV OSHAWA CRUISE OSI STATION 024 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	SAL
0	1.36	30.86	32.661
6	1.40	27.38	32.665
16	1.66	3.74	32.669
31	1.28	0.18	32.660

45.68 359.66 - WATER COLUMN VALUES

MESSANGER TIME 0946 INCOMING SOLAR RADIATION - AM 235 PM 193

DEPTH	CNAV OSHAWA TEMP	E(T)	CRUISE OSI SAL	E(S)	STATION 024 SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.39	0.00	32.685	0.000	25.10	287.0	0.000	0.00	6.65	0.00	
10	10.29	0.00	32.686	0.000	25.12	285.5	0.029	0.02	6.52	0.00	
20	10.26	0.00	32.704	0.000	25.14	283.8	0.058	0.06	6.60	0.00	
30	10.29	0.00	32.714	0.000	25.14	283.8	0.087	0.13	6.61	0.00	
50	9.91	0.00	33.045	0.000	25.46	253.6	0.141	0.35	5.57	0.00	
75	9.40	0.00	33.387	0.000	25.81	220.7	0.200	0.73	4.02	0.00	
100	8.94	0.00	33.579	0.000	26.11	192.5	0.253	1.19	3.51	0.00	
150	8.21	0.00	33.928	0.000	26.42	164.1	0.342	2.33	1.98	0.00	
200	7.78	0.00	33.986	0.000	26.53	154.5	0.423	3.77	2.25	0.02	1.15
250	7.27	0.01	34.030	0.000	26.64	144.9	0.498	5.50	1.78	0.05	1.15
300	6.78	0.00	34.065	0.002	26.73	136.4	0.569	7.50	1.31	0.01	0.97
400	5.98	0.01	34.110	0.006	26.87	123.9	0.700	12.20	0.88	0.06	0.76
500	5.35	0.00	34.153	0.002	26.99	113.9	0.820	17.72	0.69	0.00	0.92
600	4.86	0.01	34.222	0.006	27.10	103.9	0.931	23.92	0.49	0.00	0.68
700	4.48	0.01	34.291	0.002	27.19	95.3	1.031	30.63	0.36	0.00	0.85
800	4.21	0.02	34.344	0.002	27.26	89.2	1.124	37.81	0.30	0.01	0.70
1000	3.78	0.01	34.425	0.001	27.37	79.8	1.295	53.55	0.33	0.00	0.91
1200	3.23	0.02	34.503	0.002	27.49	69.1	1.446	70.52	0.48	0.01	0.70
1500	2.55	0.04	34.569	0.005	27.60	58.1	1.640	97.17	0.78	0.02	1.65

CNAV OSHAWA CRUISE 051 STATION 025 OBSERVED VALUES									
DATE 18/03/63	HR 21.0	LAT 43-14 N	LONG 124-53 W	WEA 03	WIND VEL 0 DIR 99				
BAROM 26.0	TEMP DRY 11.7	WET 11.7	RELHU 99	WTRCLR 0, 0	SEA 1 DIR 32	SWELL 2 DIR 30			
CLOUD TYPE 8	AMT 6	VIS 7	WIRE ANGLE(S)	0, 0					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SEC DI	SATN
					MGA/L				
1	0	10.31	32.677	25.11	6.69	0.598	-0.046	108	
1	5	10.27	32.691	25.13	6.65	0.594	-0.042	108	
1	10	10.18	32.717	25.16	6.66	0.595	-0.042	108	
1	20	10.12	32.699	25.16	6.66	0.595	-0.041	107	
1	30	10.12	32.715	25.17	6.50	0.581	-0.026	105	
1	50	9.55	33.186	25.63	5.01	0.447	0.112	80	
1	75	9.12	33.585	26.01	3.89	0.347	0.216	62	
1	100	8.72	33.773	26.22	3.21	0.287	0.281	50	
1	125	8.33	33.895	26.38	2.74	0.245	0.328	43	
1	150	8.20	33.914	26.41	2.57	0.230	0.345	40	
2	169	7.99	33.953	26.47	2.46	0.220	0.357	38	
2	193	7.32	34.015	26.62	2.08	0.186	0.400	32	
2	289	6.20	34.088	26.83	1.24	0.111	0.491	18	
2	361	5.86	34.122	26.90	1.00	0.089	0.517	15	

CNAV OSHAWA CRUISE 051 STATION 025 BIOLOGICAL DATA			
DEPTH	CHL-A	PRODUCTIVITY	
	LAB-I	DECK-I	
0	1.48		
6	1.55		
16	1.67		
31	1.19		
46.73 - WATER COLUMN VALUES			
MESSENGER TIME 1302 INCOMING SOLAR RADIATION - AM 235 PM 193			

CNAV OSHAWA				CRUISE OS1				STATION 025				INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO						
0	10.31	0.00	32.677	0.000	25.11	286.3	0.000	0.00	6.69	0.00							
10	10.18	0.00	32.717	0.000	25.16	281.4	0.029	0.02	6.66	0.00							
20	10.12	0.00	32.699	0.000	25.16	282.0	0.057	0.06	6.66	0.00							
30	10.12	0.00	32.715	0.000	25.17	281.0	0.086	0.13	6.50	0.00							
50	9.55	0.00	33.186	0.000	25.63	237.5	0.138	0.34	5.01	0.00							
75	9.12	0.00	33.585	0.000	26.01	201.8	0.193	0.69	3.89	0.00							
100	8.72	0.00	33.773	0.000	26.22	182.2	0.242	1.12	3.21	0.00							
150	8.20	0.00	33.914	0.000	26.41	165.0	0.329	2.23	2.57	0.00							
200	7.18	0.02	34.026	0.003	26.65	143.2	0.407	3.62	1.99	0.01	1.11						
250	6.46	0.07	34.077	0.010	26.79	130.5	0.476	5.20	1.48	0.02	1.26						
300	6.16	0.02	34.089	0.003	26.84	126.3	0.541	7.03	1.19	0.01	1.14						

CNAV OSHAWA CRUISE OS1 STATION 026 OBSERVED VALUES

FIVE MILE POINT

DATE 18/03/63 HR 23.0 LAT 43-14 N LONG 124-39 W SNGD 137 WEA 01 WIND VEL 0 DIR 99
BAROM 26 TEMP DRY 12.2 WET 11.7 RELHU 94 WTRCLR SECDI SEA SWELL 2 DIR 28
CLOUD TYPE 8 AMT 3 VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		SATN	
					ML/L	MGA/L	AOU	
1	0	10.27	32.582	25.04	6.82	0.609	-0.056	110
1	5	10.26	32.588	25.05	6.78	0.606	-0.053	110
1	10	10.26	32.588	25.05	6.84	0.611	-0.058	111
1	20	10.18	32.589	25.06	6.80	0.607	-0.054	110
1	30	10.13	32.644	25.11	6.65	0.594	-0.040	107
1	50	9.61	33.303	25.71	4.93	0.440	0.118	79
1	75	8.48	33.765	26.25	3.02	0.270	0.301	47
1	100	7.88	33.932	26.47	2.42	0.216	0.362	37
1	135	7.37	34.002	26.60	1.92	0.171	0.414	29

CNAV OSHAWA CRUISE 051 STATION 026 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 1.12
6 1.21
16 1.32
31 1.08

37.62 - WATER COLUMN VALUES

MESSANGER TIME 1500 INCOMING SOLAR RADIATION - AM 235 PM 193

CNAV OSHAWA CRUISE 051 STATION 026				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.27	0.00	32.582	0.000	25.04	292.6	0.000	0.00	6.82	0.00	
10	10.26	0.00	32.588	0.000	25.05	292.2	0.030	0.02	6.84	0.00	
20	10.18	0.00	32.589	0.000	25.06	291.1	0.059	0.06	6.80	0.00	
30	10.13	0.00	32.644	0.000	25.11	286.4	0.088	0.14	6.65	0.00	
50	9.61	0.00	33.303	0.000	25.71	229.8	0.140	0.34	4.93	0.00	
75	8.48	0.00	33.765	0.000	26.25	178.8	0.192	0.67	3.02	0.00	
100	7.88	0.00	33.932	0.000	26.47	158.2	0.234	1.04	2.42	0.00	

CNAV OSHAWA

CRUISE OSI

STATION 027

OBSERVED VALUES

DATE 19/03/63

HR 06.2

LAT 44-44 N

LONG 124-09 W

WEA 02

WIND VEL 12 DIR 18

BAROM 26.0

TEMP DRY 10.0

WET 9.4

RELHU 93

WTRCLR

SECDI 64

SEA 2 DIR 18

SWELL 2 DIR 30

CLOUD TYPE

AMT 3

VIS 7

WIRE ANGLE(S) 8

CAPE FOULWEATHER

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.68	32.073	24.74	6.77	0.605	-0.043		108
1	5	9.69	32.081	24.75	5.62	0.502	0.060		89
1	10	9.65	32.122	24.79	5.01	0.447	0.115		80
1	19	9.34	32.941	25.48	4.36	0.389	0.174		69
1	29	9.39	33.055	25.56	3.73	0.333	0.229		59
1	49	9.07	33.444	25.91	3.38	0.302	0.263		53

CNAV OSHAWA				CRUISE OSI				STATION 027		INTERPOLATED AND COMPUTED VALUES			
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	9.68	0.00	32.073	0.000	24.74	321.1	0.000	0.00	6.77	0.00			
10	9.65	0.00	32.122	0.000	24.79	317.1	0.033	0.02	5.01	0.00	0.88		
20	9.34	0.01	32.970	0.013	25.50	249.7	0.061	0.06	4.29	0.00			
30	9.40	0.01	33.045	0.016	25.55	245.2	0.086	0.12	3.68	0.00	1.23		

CNAV OSHAWA										CRUISE 051				STATION 029				OBSERVED VALUES			
DATE 19/03/63		HR 10.5	LAT 44-44 N	LONG 124-56 W	WEA 02	WIND VEL 18 DIR 21	SEA 3	DIR 18	SWELL 4 DIR 22												
BAROM 25.0		TEMP DRY 10.0	WET 10.0	RELHU 99	WTRCLR	SECDI	640														
CLOUD TYPE		AMT 8	VIS 6	WIRE ANGLE(S) 10.29																	
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN												
1	0	9.84	31.844	24.54	6.96	0.622	-0.061		111												
1	5	9.84	31.844	24.54	6.99	0.624	-0.063		111												
1	10	9.85	31.851	24.54	6.98	0.623	-0.063		111												
1	20	9.73	32.011	24.69	6.78	0.606	-0.044		108												
1	29	9.78	32.308	24.91	6.43	0.574	-0.014		103												
1	49	9.90	33.042	25.46	5.58	0.498	0.057		90												
1	74	9.81	33.256	25.64	5.22	0.466	0.090		84												
1	99	9.28	33.515	25.93	4.14	0.370	0.192		66												
1	123	8.78	33.653	26.12	3.38	0.302	0.266		53												
2	146	8.67	33.774	26.23	3.02	0.270	0.299		47												
1	148	8.43	33.825	26.31	2.92	0.261	0.311		46												
2	169	8.12	33.883	26.40	2.79	0.249	0.326		43												
2	256	6.94	33.997	26.66	2.14	0.191	0.400		32												
2	436	5.22	34.109	26.97	0.93	0.083	0.533		13												

CNAV OSHAWA			CRUISE OSI			STATION 029			INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	9.84	0.00	31.844	0.000	24.54	340.5	0.000	0.00	6.96	0.00	0.99			
10	9.85	0.00	31.851	0.000	24.54	340.3	0.035	0.02	6.98	0.00				
20	9.73	0.00	32.011	0.000	24.69	326.8	0.068	0.07	6.78	0.00				
30	9.79	0.00	32.349	0.005	24.94	302.8	0.100	0.15	6.38	0.00				
50	9.90	0.00	33.058	0.005	25.47	252.5	0.156	0.37	5.57	0.01	0.95			
75	9.79	0.00	33.267	0.001	25.66	235.8	0.218	0.77	5.18	0.01	0.94			
100	9.26	0.00	33.522	0.001	25.94	209.0	0.274	1.27	4.10	0.00	0.94			
150	8.50	0.07	33.812	0.012	26.29	177.0	0.371	2.49	2.94	0.02	0.88			
200	7.68	0.00	33.938	0.006	26.51	156.6	0.455	3.99	2.57	0.01	1.42			
250	7.02	0.00	33.993	0.002	26.65	144.1	0.531	5.74	2.19	0.00	0.90			
300	6.42	0.01	34.010	0.020	26.74	135.6	0.601	7.72	1.79	0.03	7.48			
400	5.47	0.01	34.055	0.030	26.89	121.6	0.731	12.36	1.10	0.04	12.44			

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CNAV OSHAWA				CRUISE OSI			STATION 030			OBSERVED VALUES								
DATE	19/03/63	HR	13.3	LAT	44-42 N	LONG	125-18 W	W	WTRCLR	SEA	3	DIR	22	WIND	VEL	20	DIR	22
BAROM	22.0	TEMP	DRY	10.0	WET	8.9	RELHU	87	WTRCLR		SECDI	2304	WEA	02				
CLOUD	TYPE	AMT	8	VIS	6	WIRE	ANGLE(S)	20										
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN									
1	0	10.44	32.784	25.18	6.48	0.579	-0.029		105									
1	5	10.35	32.802	25.21	6.48	0.579	-0.027		105									
1	9	10.35	32.788	25.19	6.49	0.580	-0.029		105									
1	19	10.37	32.794	25.19	6.49	0.580	-0.029		105									
1	28	10.37	32.784	25.18	6.40	0.572	-0.021		104									
1	47	10.36	32.786	25.19	6.27	0.560	-0.009		102									
1	70	9.20	33.188	25.69	5.29	0.472	0.091		84									
1	94	8.80	33.536	26.03	3.96	0.354	0.214		62									
1	117	8.53	33.770	26.25	3.24	0.289	0.281		51									
1	141	8.00	33.871	26.41	2.90	0.259	0.318		45									
1	164	7.46	33.918	26.52	2.81	0.251	0.333		43									

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 030		INTERPOLATED AND COMPUTED VALUES							VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)				
0	10.44	0.00	32.784	0.000	25.17	280.4	0.000	0.00	6.48	0.00	1.00 0.85 0.96 0.85 0.77 0.71 4.70			
10	10.35	0.00	32.788	0.001	25.19	278.9	0.029	0.01	6.49	0.00				
20	10.37	0.00	32.793	0.000	25.19	279.0	0.057	0.06	6.48	0.00				
30	10.39	0.01	32.776	0.004	25.17	280.8	0.085	0.13	6.40	0.01				
50	10.22	0.04	32.828	0.009	25.24	274.6	0.141	0.36	6.18	0.01	0.85 0.77 0.71 4.70			
75	9.08	0.02	33.268	0.001	25.77	224.6	0.204	0.76	5.00	0.02				
100	8.74	0.01	33.608	0.001	26.09	194.7	0.257	1.23	3.73	0.01				
150	7.78	0.00	33.890	0.001	26.46	160.7	0.346	2.35	2.85	0.00				

CNAV OSHAWA CRUISE OSI STATION 30A BIOLOGICAL DATA

DATE 19/03/63 LAT 44-44 N LONG 125-29 W

DEPTH	CHL-A		PRODUCTIVITY		SAL
	LAB-I	DECK-I	LAB-I	DECK-I	
0	1.60		32.06		32.536
0			32.16		

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THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT INTENSITY INSTEAD OF 100 PERCENT

CNAV OSHAWA CRUISE 051 STATION 031 OBSERVED VALUES									
DATE 19/03/63		HR 15.6	LAT 44-42 N	LONG 125-42 W	SEA 50	WIND VEL 25 DIR 20			
BAROM 21.0		TEMP DRY 10.0	WET 10.0	RELHU 99	WTRCLR	SNRG 2834	SEA 3	DIR 22	SWELL 3 DIR 27
CLOUD TYPE		AMT 7	VIS 7	WIRE ANGLE(S) 10.22		SECDI			
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	ADU	SATN	
1	0	10.01	32.598	25.10	6.56	0.586	-0.030	105	
1	5	9.99	32.605	25.11	6.49	0.580	-0.024	104	
1	10	10.01	32.610	25.11	6.49	0.580	-0.024	104	
1	20	10.00	32.606	25.11	6.50	0.581	-0.025	104	
1	29	10.01	32.601	25.10	6.57	0.587	-0.031	106	
1	49	9.94	32.609	25.12	6.50	0.581	-0.024	104	
1	74	10.03	33.095	25.48	5.69	0.508	0.046	92	
1	99	9.38	33.505	25.91	4.41	0.394	0.166	70	
1	123	8.78	33.758	26.20	3.29	0.294	0.273	52	
1	148	8.30	33.836	26.34	2.99	0.267	0.306	47	
2	164	8.09	33.839*	26.37	2.72	0.243	0.333	42	
2	187	7.60	33.897	26.49	2.12	0.189	0.393	33	
2	282	6.39	33.980	26.72	2.14	0.191	0.408	32	
2	472	5.22	34.124	26.98	0.84	0.075	0.541	12	
2	712	4.34	34.279	27.20	0.26	0.023	0.606	4	
2	952	3.74	34.370	27.33	0.26	0.023	0.615	4	
2	1434	2.72	34.502	27.53	0.64	0.057	0.597	9	
2	1723	2.25	34.554	27.62	1.04	0.093	0.570	14	

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 031		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	10.01	0.00	32.598	0.000	25.10	287.3	0.000	0.00	6.56	0.00	0.99	
10	10.01	0.00	32.610	0.000	25.11	286.6	0.029	0.02	6.49	0.00		
20	10.00	0.00	32.606	0.000	25.11	286.9	0.058	0.06	6.50	0.00		
30	10.01	0.00	32.597	0.002	25.10	287.9	0.087	0.13	6.58	0.00		
50	9.95	0.01	32.624	0.004	25.13	285.4	0.145	0.37	6.48	0.00	0.95	
75	10.01	0.00	33.114	0.000	25.50	250.6	0.212	0.80	5.64	0.00	0.94	
100	9.35	0.00	33.519	0.000	25.92	210.7	0.271	1.31	4.35	0.00	0.94	
150	8.27	0.00	33.840	0.000	26.34	171.6	0.367	2.53	2.96	0.00	0.96	
200	7.38	0.02	33.911	0.002	26.53	154.4	0.449	3.99	2.02	0.09	1.24	
250	6.70	0.03	33.958	0.003	26.66	142.5	0.524	5.72	1.93	0.17	1.11	
300	6.23	0.02	33.995	0.000	26.75	134.4	0.594	7.68	2.04	0.04	0.96	
400	5.54	0.05	34.072	0.000	26.90	121.2	0.723	12.29	1.39	0.10	0.75	
500	5.09	0.01	34.145	0.001	27.01	111.5	0.840	17.69	0.73	0.01	0.87	
600	4.69	0.02	34.213	0.001	27.11	102.7	0.948	23.79	0.42	0.03	0.67	
700	4.37	0.00	34.272	0.000	27.19	95.4	1.048	30.46	0.27	0.00	0.93	
800	4.10	0.01	34.317	0.002	27.25	89.8	1.142	37.67	0.22	0.02	0.64	
1000	3.63	0.00	34.386	0.000	27.36	80.9	1.315	53.58	0.28	0.00	0.95	
1200	3.18	0.00	34.446	0.000	27.45	72.7	1.470	71.11	0.40	0.01	0.89	
1500	2.60	0.00	34.515	0.000	27.56	62.7	1.676	99.53	0.72	0.00	0.95	

CNAV OSHAWA CRUISE OSI STATION 032 OBSERVED VALUES

DATE 19/03/63 HR 19.3 LAT 44-45 N LONG 126-01 W WEA 01 WIND VEL 20 DIR 22
 BAROM 22.2 TEMP DRY 11.1 WET 11.1 RELHU 99 WTRCLR SECDf SNGD 2834 SEA 3 DIR 22 SWELL 3 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	10.30	32.626	25.07	6.52	0.582	-0.029	105
1	5	10.20	32.640	25.10	6.58	0.588	-0.034	106
1	10	10.21	32.616	25.08				
1	20	10.21	32.638	25.10	6.49	0.580	-0.026	105
1	30	10.19	32.704	25.15	6.37	0.569	-0.016	103
1	50	10.20	32.721	25.16	6.24	0.557	-0.004	101
1	75	9.82	33.055	25.49	5.45	0.487	0.070	87
1	100	9.00	33.553	26.01	3.93	0.351	0.214	62
1	125	8.61	33.798	26.26	3.08	0.275	0.294	48
1	150	8.34	33.877	26.36	2.80	0.250	0.322	44
1	175	7.85	33.964	26.50	2.63	0.235	0.344	41

CNAV OSHAWA CRUISE OSI STATION 032 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	1-23	27.32	32.631
4	1-16	27.60	32.666
20	1-33	6.80	32.650
44	0.74	0.00	32.712
49.49		466.58	- WATER COLUMN VALUES

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CNAV OSHAWA			CRUISE OSI		STATION 032		INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.30	0.00	32.626	0.000	25.07	289.9	0.000	0.00	6.52	0.00	1.12
10	10.21	0.00	32.616	0.000	25.08	289.3	0.030	0.02	6.58	0.01	
20	10.21	0.00	32.638	0.000	25.10	287.9	0.059	0.06	6.49	0.00	
30	10.19	0.00	32.704	0.000	25.15	282.9	0.087	0.13	6.37	0.00	
50	10.20	0.00	32.721	0.000	25.16	282.2	0.144	0.37	6.24	0.00	1.12
75	9.82	0.00	33.055	0.000	25.49	251.9	0.212	0.79	5.45	0.00	
100	9.00	0.00	33.553	0.000	26.01	202.7	0.269	1.30	3.93	0.00	
150	8.34	0.00	33.877	0.000	26.36	169.8	0.363	2.48	2.80	0.00	

CNAV OSHAWA				CRUISE OSI		STATION 033		OBSERVED VALUES	
DATE 19/03/63	HR 22.7	LAT 44-44 N	LONG 126-35 W	SEA 03	WIND VEL 25 DIR 22	WIND VEL 25 DIR 22	SEA 03	WIND VEL 25 DIR 22	SEA 03
BAROM 20.0	TEMP DRY 11.1	WET 11.1	RELHU 99	WTRCLR	SNRG 2743	SEC DI	SEA 03	WIND VEL 25 DIR 22	SEA 03
CLOUD TYPE 6	AMT 8	VIS 7	WIRE ANGLE(S)	0.27	0.27	0.27	0.27	0.27	0.27
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN	
1	0	10.35	32.650	25.08	6.61	0.590	-0.039	107	
1	5	10.34	32.648	25.08	6.64	0.593	-0.041	108	
1	10	10.31	32.653	25.09	6.64	0.593	-0.041	107	
1	20	10.33	32.644	25.08	6.59	0.589	-0.037	107	
1	30	10.31	32.664	25.10	6.62	0.591	-0.039	107	
1	50	10.21	32.676	25.13	6.47	0.578	-0.025	104	
1	75	10.02	32.741	25.21	6.45	0.576	-0.021	104	
1	100	9.12	33.240	25.74	5.08	0.454	0.111	80	
1	125	8.78	33.545	26.04	3.91	0.349	0.219	61	
1	150	8.54	33.752	26.23	3.28	0.293	0.277	51	
2	155	7.91	33.878	26.43	2.97	0.265	0.313	46	
2	177	7.71	33.921	26.49	2.78	0.248	0.332	43	
2	265	6.67	33.998	26.70	2.09	0.187	0.408	31	
2	442	5.56	34.090	26.91	1.05	0.094	0.517	15	
2	662	4.41	34.269	27.18	0.30	0.027	0.601	4	
2	897	3.77	34.374	27.33	0.24	0.021	0.616	3	
2	1380	2.69	34.514	27.55	0.61	0.054	0.601	8	
2	1674	2.25	34.560	27.62	0.99	0.088	0.574	13	
2	1969	1.95	34.590	27.67	1.44	0.129	0.539	19	
2	2266	1.80	34.624	27.71	1.70	0.152	0.518	23	

CNAV OSHAWA			CRUISE OSI		STATION 033		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0 10 20 30	10.35	0.00	32.650	0.000	25.08	288.9	0.000	0.00	6.61	0.00		
	10.31	0.00	32.653	0.000	25.09	288.2	0.030	0.02	6.64	0.00		
	10.33	0.00	32.644	0.000	25.08	289.4	0.059	0.06	6.59	0.00		
	10.31	0.00	32.664	0.000	25.10	287.8	0.088	0.13	6.62	0.00		
50 75 100 150	10.21	0.00	32.676	0.000	25.13	285.7	0.146	0.37	6.47	0.00		
	10.02	0.00	32.741	0.000	25.21	278.3	0.217	0.83	6.45	0.00		
	9.12	0.00	33.240	0.000	25.74	227.8	0.280	1.39	5.08	0.00		
	8.54	0.00	33.752	0.000	26.23	182.0	0.384	2.69	3.26	0.00		
200 250 300 400	7.44	0.02	33.949	0.004	26.55	152.4	0.468	4.18	2.59	0.00	1.34	
	6.85	0.02	33.991	0.003	26.67	142.0	0.542	5.89	2.20	0.00	0.89	
	6.39	0.03	34.018	0.003	26.75	134.7	0.612	7.86	1.85	0.00	0.91	
	5.76	0.03	34.070	0.004	26.87	124.0	0.742	12.53	1.26	0.00	0.76	
500 600 700 800	5.22	0.01	34.137	0.005	26.99	113.5	0.862	18.05	0.79	0.00	0.75	
	4.69	0.01	34.219	0.005	27.11	102.2	0.971	24.18	0.45	0.00	0.71	
	4.28	0.01	34.290	0.001	27.21	93.1	1.070	30.75	0.26	0.01	0.82	
	3.99	0.02	34.338	0.003	27.28	87.1	1.161	37.76	0.21	0.02	0.60	
1000 1200 1500 2000	3.51	0.00	34.411	0.001	27.39	77.6	1.328	53.10	0.28	0.01	0.93	
	3.05	0.00	34.472	0.001	27.48	69.2	1.476	69.86	0.41	0.01	0.88	
	2.49	0.00	34.536	0.001	27.58	59.9	1.673	96.96	0.75	0.00	0.60	
	1.93	0.00	34.593	0.000	27.67	51.3	1.955	147.40	1.48	0.00	1.10	

CNAV OSHAWA CRUISE OSI STATION 034							
				OBSERVED VALUES			
DATE	20/03/63	HR	03-2	LAT	44-42 N	LONG	127-12 W
BAROM	16.	TEMP	DRY 10.0	WET	10.0	RELHU	99
CLOUD	TYPE	AMT	9	VIS	6	WIRE	ANGLE(S) 13
						SNDG	2871
						WEA	50
						SEA	3
						DIR	20
						SWELL	4
						DIR	30

DATE 20/03/63 HR 03.2 LAT 44-42 N LONG 127-12 W
 8BAROM 16. TEMP DRY 10.0 WET 10.0 RELHU 99 WTRCLR
 CLOUD TYPE AMT 9 VIS 6 WIRE ANGLE(S) 13
 SNDG 2871 WEA 50 WIND VEL 25 DIR 20
 SECDI SEA 3 DIR 20 SWELL 4 DIR 30

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	10.00	32.590	25.09	6.71	0.599	-0.043		108
1	5	9.91	32.590	25.11	5.54	0.495	0.062		89
1	10	9.92	32.638	25.14	5.90	0.527	0.030		95
1	19	9.94	32.579	25.10	6.34	0.566	-0.009		102
1	29	9.84	32.614	25.14	6.16	0.550	0.008		99
1	49	9.83	32.649	25.17	6.30	0.563	-0.005		101
1	73	9.78	32.617	25.15	5.67	0.506	0.052		91
1	97	8.37	33.378	25.97	3.87	0.346	0.228		60
1	121	8.86	33.805	26.23	3.03	0.271	0.295		48
1	146	8.46	33.845	26.32	2.93	0.228	0.343		60
1	170	7.75	33.864	26.44	2.55	0.262	0.318		55

DEPTH	CNAV USHAWA		CRUISE OSI		STATION 034		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEO POT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	10.00	0.00	32.590	0.000	25.09	287.7	0.000	0.00	6.71	0.00			
10	9.92	0.00	32.638	0.000	25.14	283.1	0.029	0.02	5.90	0.00			
20	9.93	0.00	32.580	0.002	25.10	287.7	0.058	0.06	6.33	0.01	0.88		
30	9.84	0.00	32.617	0.000	25.14	283.7	0.087	0.13	6.17	0.01	0.98		
50	9.84	0.01	32.641	0.006	25.16	282.4	0.144	0.37	6.29	0.00	0.95		
75	9.65	0.04	32.672	0.014	25.21	277.8	0.214	0.82	5.52	0.03	0.89		
100	8.60	0.05	33.451	0.001	26.02	201.4	0.275	1.35	3.72	0.00	0.84		
150	8.35	0.00	33.840	0.003	26.33	172.7	0.369	2.54	2.91	0.01	5.52		

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.00	0.00	32.590	0.000	25.09	287.7	0.000	0.00	6.71	0.00	
10	9.92	0.00	32.638	0.000	25.14	283.1	0.029	0.02	5.90	0.00	
20	9.93	0.00	32.580	0.002	25.10	287.7	0.058	0.06	6.33	0.01	0.88
30	9.84	0.00	32.617	0.000	25.14	283.7	0.087	0.13	6.17	0.01	0.98
50	9.84	0.01	32.641	0.006	25.16	282.4	0.144	0.37	6.29	0.00	0.95
75	9.65	0.04	32.672	0.014	25.21	277.6	0.214	0.82	5.52	0.03	0.89
100	8.40	0.05	33.451	0.001	26.02	201.4	0.275	1.35	3.72	0.00	0.84
150	8.35	0.00	33.840	0.003	26.33	172.7	0.369	2.54	2.91	0.01	5.52

CNAV OSHAWA CRUISE OSI STATION 035 OBSERVED VALUES									
DATE 20/03/63		HR 06-6	LAT 44-44 N	LONG 127-25 W	WEA 81	WIND VEL 24 DIR 20			
BAROM 15.0		TEMP DRY 10.0	WET 10.0	RELHU 99	WTRCLR	SEA 3 DIR 20 SWELL 3 DIR 27			
CLOUD TYPE		AMT 8	VIS 6	WIRE ANGLE(S) 13.27					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.19	32.593	25.06	6.49	0.580	-0.026		105
1	5	10.15	32.615	25.09	6.50	0.581	-0.026		105
1	10	10.17	32.623	25.09	6.58	0.588	-0.034		106
1	19	10.16	32.595	25.07	6.47	0.578	-0.024		104
1	29	10.14	32.593	25.07	6.45	0.576	-0.022		104
1	49	10.05	32.612	25.10	6.37	0.569	-0.014		102
1	73	10.06	32.598	25.09	6.37	0.569	-0.014		102
1	97	8.64	32.734	25.42	6.02	0.538	0.035		94
1	121	7.99	33.310	25.97	4.62	0.413	0.167		71
1	146	7.80	33.592	26.22	3.83	0.342	0.239		59
2	161	7.65	33.724	26.34	3.73	0.333	0.249		57
2	183	7.64	33.830	26.43	3.36	0.300	0.282		52
2	277	6.20	33.936	26.71	2.68	0.239	0.363		40
2	463	4.22	34.041	27.02	1.09	0.097	0.535		15
2	697	4.05	34.212	27.18	0.40	0.036	0.598		6
2	932	3.65	34.377	27.35	0.24	0.021	0.618		3
2	1402	2.69	34.507	27.54	0.61	0.054	0.601		8
2	1685	2.21	34.564	27.63	1.00	0.089	0.574		13

DEPTH	CNAV OSHAWA			CRUISE OSI		STATION 035		INTERPOLATED AND COMPUTED VALUES						VAR RATIO
	TEMP	E(T)		SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)			
0	10.19	0.00		32.593	0.000	25.06	290.5	0.000	0.00	6.49	0.00			
10	10.17	0.00		32.623	0.000	25.09	288.2	0.030	0.02	6.58	0.00			
20	10.16	0.00		32.594	0.000	25.07	290.4	0.059	0.06	6.47	0.00			
30	10.14	0.00		32.594	0.000	25.07	290.2	0.088	0.14	6.45	0.00	0.88		
50	10.06	0.01		32.610	0.001	25.10	288.2	0.146	0.37	6.37	0.00	0.95		
75	9.95	0.03		32.598	0.004	25.11	287.8	0.219	0.84	6.37	0.01	0.89		
100	8.53	0.01		32.802	0.013	25.49	251.4	0.287	1.44	5.86	0.03	0.84		
150	7.76	0.00		33.631	0.001	26.26	179.7	0.395	2.79	3.80	0.01	0.66		
200	7.45	0.06		33.871	0.013	26.49	158.4	0.481	4.31	3.19	0.04	1.32		
250	6.71	0.09		33.936	0.018	26.64	144.3	0.557	6.07	2.80	0.05	1.07		
300	5.88	0.01		33.952	0.003	26.76	133.1	0.627	8.03	2.47	0.02	0.94		
400	4.73	0.02		34.012	0.006	26.94	116.1	0.752	12.51	1.60	0.05	0.74		
500	4.11	0.06		34.067	0.001	27.05	105.9	0.865	17.67	0.91	0.02	0.83		
600	3.98	0.11		34.139	0.002	27.13	99.9	0.969	23.53	0.57	0.04	0.68		
700	4.05	0.00		34.214	0.000	27.13	95.9	1.067	30.14	0.40	0.00	0.98		
800	3.89	0.01		34.289	0.002	27.25	89.5	1.161	37.36	0.28	0.01	0.61		
1000	3.51	0.01		34.405	0.005	27.38	78.1	1.331	52.95	0.25	0.01	0.94		
1200	3.10	0.02		34.470	0.009	27.47	70.0	1.481	69.86	0.37	0.02	0.88		
1500	2.51	0.01		34.523	0.004	27.57	61.0	1.680	97.36	0.74	0.01	0.89		

CNAV OSHAWA CRUISE OSI STATION 036 OBSERVED VALUES

DATE 20/03/63 HR 14.4 LAT 44-42 N LONG 128-54 W WEA 02 WIND VEL 42 DIR 19
 BAROM 04. TEMP DRY . WET WTRCLR SEA 4 DIR 19 SWELL 5 DIR 21
 CLOUD TYPE VIS . WIRE ANGLE(S) 23

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	10.27	32.636	25.08	6.34	0.566	-0.014	102	
1	5	10.27	32.639	25.09	6.34	0.566	-0.014	102	
1	9	10.29	32.635	25.08	6.40	0.572	-0.019	103	
1	18	10.28	32.635	25.08	6.35	0.567	-0.015	103	
1	28	10.28	32.641	25.09	6.34	0.566	-0.014	103	
1	46	10.28	32.678	25.12	6.29	0.562	-0.009	102	
1	69	10.22	32.634	25.09	6.28	0.561	-0.007	101	
1	92	10.19	32.634	25.10	6.28	0.561	-0.007	101	
1	115	8.19	33.040	25.73	5.42	0.484	0.094	84	
1	138	7.85	33.420	26.08	4.55	0.406	0.175	70	

CNAV OSHAWA CRUISE OSI STATION 036 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.30	4.42	32.630
0		3.36	

MESSANGER TIME 0635 INCOMING SOLAR RADIATION - AM 48 PM 40

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT INTENSITY INSTEAD OF 100 PERCENT

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 036		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEO POT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	10.27	0.00	32.636	0.000	25.08	288.6	0.000	0.00	6.34	0.00	0.99	
10	10.29	0.00	32.635	0.000	25.08	289.3	0.030	0.02	6.40	0.00	1.04	
20	10.28	0.00	32.636	0.000	25.08	289.2	0.059	0.06	6.35	0.00	1.11	
30	10.28	0.00	32.646	0.002	25.09	288.7	0.088	0.14	6.34	0.01	0.82	
50	10.27	0.00	32.672	0.004	25.11	286.9	0.146	0.37	6.33	0.00	0.82	
75	10.31	0.06	32.612	0.012	25.06	292.4	0.219	0.84	6.33	0.03	0.72	
100	9.51	0.14	32.754	0.016	25.30	269.8	0.290	1.48	6.03	0.03	0.67	

CNAV OSHAWA CRUISE 031 STATION 037 OBSERVED VALUES									
DATE 20/03/63		HR 20.0	LAT 45-11 N	LONG 129-34 W	WEA 18	WIND VEL 15 DIR 33			
BAROM 06.		TEMP DRY 7.8	WET 7.8	RELHU	WTRCLR	SEA 2 DIR 32	SWELL 4 DIR		
CLOUD TYPE	AMT 8	VIS 5	WIRE ANGLE(S)	10,13					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.16	32.592	25.07	6.42	0.573	-0.019		103
1	5	10.17	32.601	25.07	6.36	0.568	-0.014		103
1	10	10.17	32.610	25.08					
1	20	10.18	32.628	25.09	6.38	0.570	-0.016		103
1	29	10.17	32.629	25.10	6.37	0.569	-0.015		103
1	49	10.18	32.632	25.10	6.32	0.564	-0.011		102
1	74	10.25	32.655	25.10	6.28	0.561	-0.008		101
1	99	8.89	32.751	25.40	6.01	0.537	0.033		94
1	123	7.24	33.076	25.89	5.62	0.502	0.089		85
1	148	7.54	33.606	26.27	4.22	0.377	0.207		64
2	169	7.44	33.728	26.38	3.96	0.354	0.232		60
2	193	7.15	33.875	26.53	3.59	0.321	0.268		54
2	290	6.02	33.939	26.73	2.69	0.240	0.364		40
2	486	4.52	34.100	27.04	1.04	0.093	0.534		15
2	730	3.99	34.279	27.24	0.26	0.023	0.611		4
2	978	3.45	34.401	27.39	0.26	0.023	0.620		4
2	1476	2.48	34.530	27.58	0.76	0.068	0.591		10
2	1776	2.07	34.582	27.65	1.17	0.104	0.561		16
2	2177	1.84	34.612	27.70	1.63	0.146	0.524		22
2	2576	1.79							

CNAV OSHAWA CRUISE OSI STATION 037 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.18	3.06		32.588
7	0.18	1.78		32.604
24	0.15	0.30		32.595
51	0.20	0.00		32.632

8.82 38.68 - WATER COLUMN VALUES

MESSENGER TIME 1202 INCOMING SOLAR RADIATION - AM 48 PM 40

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 037		INTERPOLATED AND COMPUTED VALUES						VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)			
0	10.16	0.00	32.592	0.000	25.07	290.1	0.000	0.00	6.42	0.00	1.13		
10	10.17	0.00	32.610	0.000	25.08	289.2	0.030	0.02	6.35	0.01			
20	10.18	0.00	32.628	0.000	25.09	288.2	0.059	0.06	6.38	0.00			
30	10.17	0.00	32.629	0.000	25.10	288.1	0.088	0.13	6.37	0.00	0.99		
50	10.20	0.01	32.632	0.000	25.09	288.7	0.146	0.37	6.32	0.00	0.95		
75	10.21	0.01	32.656	0.001	25.11	287.7	0.218	0.84	6.27	0.00	0.94		
100	8.81	0.01	32.760	0.000	25.42	258.6	0.287	1.45	6.00	0.01	0.94		
150	7.54	0.00	33.624	0.004	26.28	177.2	0.397	2.81	4.18	0.01	0.86		
200	7.06	0.00	33.894	0.010	26.56	151.4	0.480	4.28	3.51	0.01	1.12		
250	6.47	0.01	33.963	0.035	26.70	139.0	0.553	5.97	3.00	0.04	1.20		
300	5.92	0.00	33.947	0.000	26.75	133.9	0.622	7.91	2.59	0.01	0.98		
400	5.05	0.00	34.028	0.002	26.92	118.6	0.749	12.45	1.69	0.03	0.76		
500	4.47	0.01	34.111	0.000	27.05	106.6	0.863	17.67	0.97	0.01	0.93		
600	4.18	0.06	34.189	0.001	27.14	98.4	0.966	23.51	0.54	0.03	0.67		
700	4.02	0.03	34.259	0.001	27.22	92.2	1.063	29.93	0.30	0.01	0.84		
800	3.84	0.00	34.318	0.001	27.28	86.6	1.153	36.90	0.21	0.02	0.70		
1000	3.40	0.00	34.409	0.001	27.40	76.5	1.318	52.08	0.27	0.00	0.98		
1200	2.99	0.01	34.471	0.004	27.49	68.5	1.465	68.64	0.43	0.02	0.89		
1500	2.44	0.00	34.535	0.000	27.59	59.3	1.660	95.48	0.79	0.00	0.87		
2000	1.91	0.01	34.605	0.000	27.68	50.2	1.938	145.09	1.45	0.00	2.87		
2500	1.79	0.00									7.54		

CNAV OSHAWA CRUISE 051 STATION 038 OBSERVED VALUES									
DATE 21/03/63		HR 05.4	LAT 46-14 N	LONG 128-46 W	SEA 62	WIND VEL 28 DIR 03			
BAROM 05.0		TEMP DRY 7.8	WET 7.8	RELHU 99	WTRCLR	SNDG 2560	SECDI	SEA 4 DIR 02	SWELL 2 DIR 36
CLOUD TYPE		AMT 8	VIS 6	WIRE ANGLE(S) 21.32					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	AOU	SATN	
1	0	9.61	32.521	25.10	6.49	0.580	-0.018	103	
1	5	9.60	32.514	25.10	6.49	0.580	-0.018	103	
1	19	9.63	32.530	25.11	6.47	0.578	-0.017	103	
1	19	9.67	32.538	25.11	6.51	0.581	-0.021	104	
1	28	9.66	32.566	25.13	6.49	0.580	-0.019	103	
1	47	9.53	32.544	25.14	6.52	0.582	-0.020	104	
1	70	9.45	32.533	25.14	6.49	0.580	-0.017	103	
1	93	9.36	32.555	25.17	6.42	0.573	-0.009	102	
1	117	7.35	32.955	25.78	5.84	0.522	0.068	88	
1	140	6.71	33.279	26.13	5.41	0.483	0.114	81	
2	152	6.80	33.286	26.12	5.34	0.477	0.119	80	
2	173	6.80	33.504	26.29	4.91	0.439	0.157	74	
2	259	6.71	33.938	26.64	2.77	0.247	0.347	42	
2	439	5.86	34.060	26.85	1.04	0.093	0.514	15	
2	665	4.26	34.214	27.16	0.34	0.030	0.600	5	
2	894	3.67	34.340	27.32	0.24	0.021	0.618	3	
2	1352	2.66	34.483	27.52	0.58	0.052	0.604	8	
2	1633	2.26	34.564	27.62	0.90	0.080	0.582	12	

CNAV OSHAWA		CRUISE OSI		STATION 038		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.61	0.00	32.521	0.000	25.10	286.8	0.000	0.00	6.49	0.00	
10	9.64	0.00	32.531	0.001	25.11	286.6	0.029	0.02	6.47	0.00	1.00
20	9.67	0.00	32.541	0.001	25.11	286.6	0.058	0.06	6.51	0.00	0.85
30	9.65	0.00	32.566	0.002	25.13	284.6	0.087	0.13	6.49	0.00	0.96
50	9.52	0.00	32.541	0.000	25.13	284.8	0.144	0.37	6.52	0.00	0.85
75	9.52	0.05	32.521	0.009	25.12	286.6	0.216	0.83	6.50	0.01	0.75
100	8.80	0.11	32.655	0.015	25.34	266.4	0.286	1.45	6.27	0.02	0.71
150	6.78	0.01	33.286	0.005	26.12	192.1	0.402	2.89	5.35	0.01	0.75
200	6.79	0.00	33.693	0.018	26.44	162.7	0.491	4.48	4.23	0.05	1.40
250	6.73	0.00	33.916	0.008	26.62	146.0	0.569	6.27	2.99	0.02	0.88
300	6.57	0.02	34.013	0.031	26.72	137.5	0.640	8.28	2.17	0.08	0.91
400	6.10	0.01	34.079	0.030	26.83	127.7	0.774	13.07	1.21	0.08	0.77
500	5.41	0.05	34.103	0.001	26.94	118.4	0.898	18.79	0.74	0.03	0.75
600	4.70	0.05	34.171	0.001	27.07	105.8	1.011	25.16	0.43	0.04	0.71
700	4.13	0.02	34.235	0.000	27.19	95.4	1.113	31.93	0.30	0.01	0.82
800	3.85	0.04	34.292	0.000	27.26	88.7	1.206	39.10	0.23	0.02	0.59
1000	3.41	0.01	34.380	0.004	27.37	78.8	1.376	54.69	0.28	0.01	0.92
1200	2.96	0.01	34.444	0.005	27.47	70.3	1.527	71.70	0.41	0.02	0.87
1500	2.42	0.00	34.522	0.003	27.58	60.1	1.725	99.04	0.75	0.01	0.77

CNAV OSHAWA CRUISE 051 STATION 039 OBSERVED VALUES									
DATE 21/03/63		HR 12-3	LAT 46-14 N	LONG 127-37 W	SEA 62	WIND VEL 35 DIR 12			
BAROM 97.		TEMP DRY	WET	RELHU	WTRCLR	SEA 4 DIR 12	SWELL 4 DIR 14		
CLOUD TYPE		AMT 8	VIS 6	WIRE ANGLE(S) 23.50					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ML/L	AOU	SATM
1	0	9.47	32.532	25.14	6.53	0.583	-0.020		104
1	5	9.49	32.515	25.12	6.54	0.584	-0.021		104
1	9	9.47	32.510	25.12	6.65	0.594	-0.031		105
1	18	9.51	32.532	25.13	6.51	0.581	-0.019		103
1	28	9.51	32.538	25.13	6.56	0.586	-0.023		104
1	46	9.42	32.529	25.14	6.51	0.581	-0.018		103
1	69	9.28	32.522	25.16	6.51	0.581	-0.016		103
1	92	9.07	32.483	25.32	6.09	0.544	0.024		96
1	115	8.12	33.301	25.94	4.46	0.398	0.179		69
1	138	7.63	33.670	26.30	3.75	0.335	0.248		57
2	402	5.56	33.992	26.83	1.78	0.159	0.452		26
2	617	4.59	34.145	27.07	0.56	0.050	0.576		8
2	834	4.09	34.294	27.24	0.26	0.023	0.610		4
2	1270	3.07	34.477	27.48	0.47	0.042	0.607		6
2	1533	2.51	34.533	27.58	0.74	0.066	0.592		10

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 039		INTERPOLATED AND COMPUTED VALUES						VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)			
0	9.47	0.00	32.532	0.000	25.14	283.8	0.000	0.00	6.53	0.00	0.97 0.78 0.93		
10	9.47	0.00	32.512	0.001	25.12	285.5	0.029	0.02	6.64	0.01			
20	9.51	0.00	32.534	0.000	25.13	284.6	0.058	0.06	6.51	0.01			
30	9.50	0.00	32.538	0.000	25.13	284.4	0.087	0.13	6.56	0.00			
50	9.40	0.00	32.522	0.004	25.14	284.4	0.144	0.37	6.52	0.01	0.82 0.72 0.67 1.48		
75	9.26	0.02	32.534	0.009	25.17	281.8	0.215	0.83	6.48	0.03			
100	8.76	0.05	32.886	0.027	25.52	248.5	0.282	1.42	5.54	0.08			
150	7.45	0.04	33.764	0.051	26.40	165.5	0.386	2.71	3.53	0.08			
200	6.81	0.17	33.785*		26.51	153.2	0.466	4.12	3.20*		0.99		
250	6.29	0.23	33.840*		26.62	142.7	0.541	5.81	2.82*				
300	5.91	0.22	33.890*		26.71	134.2	0.612	7.75	2.46*				
400	5.56	0.01	34.003	0.009	26.84	126.5	0.744	12.39	1.77	0.01			
500	5.05	0.01	34.068	0.004	26.95	116.6	0.866	18.04	1.15	0.02	0.62		
600	4.65	0.00	34.135	0.001	27.05	107.8	0.980	24.43	0.63	0.01	0.89		
700	4.37	0.02	34.205	0.001	27.14	100.4	1.085	31.44	0.37	0.03	0.64		
800	4.15	0.01	34.272	0.001	27.21	93.7	1.183	38.99	0.27	0.01	0.75		
1000	3.70	0.01	34.379	0.002	27.35	82.1	1.361	55.35	0.26	0.03	0.90		
1200	3.23	0.00	34.457	0.001	27.45	72.5	1.518	72.99	0.39	0.02	0.90		
1500	2.58	0.00	34.528	0.000	27.57	61.4	1.721	101.06	0.71	0.00	15.15		

MACHINE-INTERPOLATED VALUES OF SALINITY AND OXYGEN AT 200, 250
AND 300 METERS WERE UNREASONABLE BECAUSE OF POOR OBSERVED SPACING.

CNAV OSHAWA CRUISE OSI STATION 041 OBSERVED VALUES									
DATE 22/03/63		HR 09.3	LAT 46-14 N	LONG 125-54 W	SEA 2	DIR 27	WIND VEL 3	DIR 36	
BAROM 13.0		TEMP DRY 8.9	WET 8.9	RELHU 99	WTRCLR 0.15, 15	SECDI	SWELL 3	DIR 27	
CLOUD TYPE	VIS 1	WIRE	ANGLE(S)						
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.44	32.428	25.06	6.53	0.583	-0.019		103
1	5	9.46	32.407	25.04	6.48	0.579	-0.015		103
1	10	9.47	32.402	25.03	6.56	0.586	-0.022		104
1	20	9.50	32.406	25.03	6.53	0.583	-0.020		104
1	30	9.49	32.408	25.04	6.50	0.581	-0.017		103
1	50	9.46	32.422	25.05	6.53	0.583	-0.020		103
1	75	9.52	32.536	25.13	6.42	0.573	-0.011		102
1	100	8.60	33.032	25.66	5.01	0.447	0.125		78
1	125	8.22	33.334	25.96	4.11	0.367	0.209		64
1	150	8.07	33.546	26.14	3.54	0.316	0.261		55
2	170	7.91	33.784	26.35	2.72	0.243	0.336		42
2	194	7.35	33.924	26.54	2.12	0.189	0.396		32
2	290	6.14	34.023	26.79	1.58	0.141	0.461		23
2	483	4.91	34.135	27.02	0.70	0.063	0.558		10
4	725	4.13	34.292	27.23	0.28	0.025	0.607		4
4	967	3.57	34.443	27.41	0.30	0.027	0.614		4
4	1450	2.58	34.509	27.55	0.67	0.060	0.597		9
4	1741	2.16	34.610	27.67	1.08	0.096	0.567		15

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 041		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	9.44	0.00	32.428	0.000	25.06	291.0	0.000	0.00	6.53	0.00		
10	9.47	0.00	32.402	0.000	25.03	293.6	0.030	0.02	6.56	0.00		
20	9.50	0.00	32.406	0.000	25.03	294.0	0.060	0.06	6.53	0.00		
30	9.49	0.00	32.408	0.000	25.04	293.8	0.089	0.14	6.50	0.00		
50	9.46	0.00	32.422	0.000	25.05	292.7	0.148	0.38	6.53	0.00		
75	9.52	0.00	32.536	0.000	25.13	285.6	0.221	0.85	6.42	0.00		
100	8.60	0.00	33.032	0.000	25.66	235.4	0.287	1.43	5.01	0.00		
150	8.07	0.00	33.546	0.000	26.14	190.4	0.394	2.78	3.54	0.00		
200	7.24	0.01	33.941	0.007	26.57	150.3	0.480	4.29	2.04	0.03	1.10	
250	6.52	0.05	34.028	0.029	26.74	134.9	0.552	5.95	1.62	0.12	1.19	
300	6.05	0.01	34.030	0.001	26.80	129.4	0.618	7.83	1.53	0.00	0.98	
400	5.31	0.04	34.093	0.005	26.94	116.7	0.743	12.26	1.03	0.01	0.76	
500	4.84	0.01	34.146	0.000	27.04	108.3	0.856	17.49	0.65	0.00	0.92	
600	4.47	0.03	34.210	0.001	27.13	100.2	0.961	23.43	0.42	0.01	0.67	
700	4.19	0.01	34.275	0.000	27.21	93.0	1.059	29.94	0.30	0.00	0.86	
800	3.94	0.01	34.343	0.003	27.29	86.1	1.150	36.90	0.26	0.01	0.68	
1000	3.49	0.00	34.450	0.005	27.42	74.6	1.312	51.84	0.31	0.00	0.96	
1200	3.06	0.01	34.486	0.018	27.49	68.3	1.457	68.16	0.43	0.00	0.89	
1500	2.50	0.00	34.517	0.004	27.57	61.3	1.654	95.43	0.73	0.00	0.97	

CNAV OSHAWA CRUISE 051 STATION 042 OBSERVED VALUES									
DATE 22/03/63	HR 13.6	LAT 46-12 N	LONG 125-30 W	SNDG 2195	WEA 02	WIND VEL 0 DIR 99			
BAROM 12.5	TEMP DRY 6.7	WET 4.4	RELHU 59	WTRCLR	SEA 2 DIR 25	SWELL 2 DIR 27			
CLOUD TYPE	AMT 3	VIS 7	WIRE ANGLE(S) 0						
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN AOU	SATN	
1	0	9.52	32.381	25.01	6.48	0.579	-0.016	103	
1	5	9.42	32.360	25.01	6.53	0.583	-0.019	103	
1	10	9.48	32.365	25.00	6.50	0.581	-0.017	103	
1	20	9.50	32.360	25.00	6.51	0.581	-0.018	103	
1	30	9.53	32.359	24.99	6.53	0.583	-0.020	104	
1	50	9.57	32.390	25.01	6.53	0.583	-0.021	104	
1	75	9.42	32.545	25.15	6.23	0.556	0.007	99	
1	100	8.53	33.319	25.90	4.71	0.421	0.151	74	
1	125	8.20	33.660	26.21	3.35	0.299	0.276	52	
1	150	7.88	33.803	26.37	2.93	0.262	0.317	45	
1	175	7.55	33.900	26.50	2.74	0.245	0.338	42	

CNAV OSHAWA CRUISE 051 STATION 042 INTERPOLATED AND COMPUTED VALUES									
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L
0	9.52	0.00	32.381	0.000	25.01	295.8	0.000	0.00	6.48
10	9.48	0.00	32.365	0.000	25.00	296.5	0.030	0.00	6.50
20	9.50	0.00	32.360	0.000	25.00	297.4	0.060	0.06	6.51
30	9.53	0.00	32.359	0.000	24.99	298.1	0.090	0.14	6.53
50	9.57	0.00	32.390	0.000	25.01	296.8	0.150	0.38	6.53
75	9.42	0.00	32.545	0.000	25.15	283.4	0.223	0.85	6.23
100	8.53	0.00	33.319	0.000	25.90	213.1	0.286	1.40	4.71
150	7.88	0.00	33.803	0.000	26.37	168.6	0.382	2.61	2.93
									0.00

CNAV OSHAWA CRUISE 051 STATION 42A BIOLOGICAL DATA
DATE 22/03/63 LAT 45-14 N LONG 125-24 W

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	1.07	19.12		32.295
0		19.62		

MESSENGER TIME 0630 INCOMING SOLAR RADIATION - AM 155 PM 163
THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
INTENSITY INSTEAD OF 100 PERCENT

CNAV OSHAWA CRUISE 051 STATION 043 OBSERVED VALUES									
DATE 22/03/63		HR 15.8	LAT 46-12 N	LONG 125-06 W	WEA 03	WIND VEL 10 DIR 06			
BAROM 11.0		TEMP DRY 7.8	WET 6.1	RELHU 78	WTRCLR	SEA 1 DIR 06 SWELL 2 DIR 27			
CLOUD TYPE		AMT 7	VIS 7	WIRE ANGLE(S) 0, 4	SECDI				
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	ADU	SATN	
1	0	9.46	32.174	24.86	6.57	0.587	-0.022	104	
1	5	9.49	32.172	24.85	6.63	0.592	-0.028	105	
1	10	9.56	32.164	24.83	6.61	0.590	-0.027	105	
1	20	9.55	32.165	24.84	6.58	0.588	-0.024	104	
1	30	9.54	32.172	24.84	6.61	0.590	-0.027	105	
1	50	9.56	32.189	24.85	6.60	0.589	-0.026	105	
1	75	8.96	32.776	25.41	5.58	0.498	0.070	88	
1	100	8.08	33.336	25.98	4.30	0.384	0.194	66	
1	125	7.88	33.561	26.18	3.82	0.341	0.239	59	
1	150	7.49	33.814	26.44	3.28	0.293	0.291	50	
2	173	7.41	33.880	26.50	3.06	0.273	0.312	47	
2	197	7.03	33.929	26.59	2.85	0.255	0.336	43	
2	296	6.11	33.998	26.77	1.90	0.170	0.433	28	
2	495	5.00	34.131	27.01	0.73	0.065	0.554	11	
2	744	4.24	34.307	27.23	0.31	0.028	0.603	4	
2	994	3.55	34.438	27.41	0.30	0.027	0.614	4	
2	1394	2.82	34.504	27.53	0.65	0.058	0.595	9	

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 043		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	9.46	0.00	32.174	0.000	24.86	310.2	0.000	0.00	6.57	0.00		
10	9.56	0.00	32.164	0.000	24.83	312.6	0.032	0.02	6.61	0.00		
20	9.55	0.00	32.165	0.000	24.84	312.6	0.063	0.07	6.58	0.00		
30	9.54	0.00	32.172	0.000	24.84	312.1	0.095	0.15	6.61	0.00		
50	9.56	0.00	32.189	0.000	24.85	311.5	0.158	0.40	6.60	0.00		
75	8.96	0.00	32.776	0.000	25.41	259.3	0.230	0.86	5.58	0.00		
100	8.08	0.00	33.336	0.000	25.98	205.3	0.288	1.37	4.30	0.00		
150	7.49	0.00	33.814	0.000	26.44	162.4	0.381	2.54	3.28	0.00		
200	6.99	0.00	33.933	0.001	26.60	147.5	0.459	3.93	2.82	0.00	1.05	
250	6.46	0.03	33.979	0.009	26.71	137.7	0.531	5.59	2.33	0.02	1.29	
300	6.08	0.00	34.001	0.000	26.78	132.0	0.599	7.50	1.87	0.00	0.99	
400	5.44	0.02	34.068	0.001	26.91	120.3	0.726	12.05	1.18	0.01	0.77	
500	4.98	0.00	34.135	0.000	27.01	110.8	0.843	17.42	0.71	0.00	0.98	
600	4.63	0.03	34.207	0.002	27.11	102.3	0.950	23.49	0.46	0.03	0.69	
700	4.35	0.02	34.277	0.001	27.20	94.8	1.050	30.13	0.33	0.02	0.79	
800	4.07	0.00	34.341	0.001	27.28	87.7	1.142	37.23	0.28	0.01	0.75	
1000	3.54	0.00	34.440	0.000	27.41	75.8	1.308	52.43	0.30	0.00	1.04	
1200	3.10	0.01	34.498	0.003	27.50	67.9	1.453	68.84	0.46	0.03	2.15	

CNAV OSHAWA CRUISE OSI STATION 044 OBSERVED VALUES

DATE 22/03/63 HR 19.1 LAT 46-14 N LONG 124-45 W WEA 02 WIND VEL 17 DIR 36
 BAROM 11.0 TEMP DRY 9.4 WET 7.8 RELHU 81 WTRCLR SEA 2 DIR 36 SWELL 2 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 11.31

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ACU	SATN
1	0	9.55	32.005	24.71	6.66	0.595	-0.031	105	
1	5	9.55	32.007	24.71	6.73	0.601	-0.037	107	
1	10	9.56	32.013	24.72	6.69	0.598	-0.034	106	
1	20	9.57	32.076	24.76	6.66	0.595	-0.031	106	
1	29	9.59	32.048	24.74	6.74	0.602	-0.039	107	
1	49	9.57	32.466	25.07	6.18	0.552	0.010	98	
1	74	9.17	33.021	25.56	4.93	0.440	0.125	78	
1	98	8.58	33.613	26.12	3.52	0.314	0.256	55	
1	123	8.26	33.738	26.27	3.14	0.280	0.294	49	
1	147	7.69	33.886*	26.47	3.14	0.280	0.302	48	
2	154	7.64	33.822	26.42	3.18	0.284	0.298	49	
2	175	7.42	33.882	26.50	3.03	0.271	0.314	46	
2	263	6.49	33.989	26.71	2.20	0.196	0.401	33	
2	440	5.43	34.089	26.93	1.04	0.093	0.520	15	
2	663	4.46	34.150*	27.08	0.39	0.035	0.593	6	
2	841	4.02	34.404	27.33	0.26	0.023	0.610	4	

CNAV OSHAWA CRUISE OSI STATION 044 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	1.27	30.06	31.990
6	1.36	27.40	31.993
16	1.46	5.56	32.000
31	1.64	0.20	32.044
45.24		380.50	WATER COLUMN VALUES

MESSANGER TIME 1109 INCOMING SOLAR RADIATION - AM 155 PM 163

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 044		INTERPOLATED AND COMPUTED VALUES				
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.55	0.00	32.005	0.000	24.71	324.1	0.000	0.00	6.66	0.00	
10	9.56	0.00	32.013	0.000	24.72	323.8	0.033	0.02	6.69	0.00	
20	9.57	0.00	32.076	0.000	24.76	319.5	0.066	0.07	6.66	0.00	
30	9.59	0.00	32.061	0.005	24.75	321.2	0.098	0.15	6.73	0.00	0.99
50	9.56	0.00	32.487	0.000	25.09	289.4	0.159	0.40	6.14	0.00	0.95
75	9.14	0.00	33.050	0.003	25.59	241.8	0.226	0.82	4.86	0.01	0.94
100	8.55	0.01	33.633	0.006	26.14	190.1	0.281	1.30	3.46	0.01	0.90
150	7.67	0.02	33.813	0.002	26.41	164.9	0.370	2.43	3.16	0.02	0.88
200	7.14	0.01	33.926	0.007	26.58	150.0	0.449	3.85	2.80	0.02	1.41
250	6.62	0.01	33.982	0.004	26.69	139.7	0.522	5.53	2.33	0.01	0.89
300	6.21	0.02	34.015	0.005	26.77	132.6	0.591	7.47	1.91	0.00	0.92
400	5.61	0.02	34.072	0.005	26.89	122.0	0.720	12.06	1.25	0.00	0.76
500	5.13	0.00	34.108	0.014	26.98	114.6	0.839	17.57	0.79	0.01	2.59
600	4.69	0.00	34.145	0.037	27.05	107.7	0.951	23.90	0.50	0.01	7.40
700	4.34	0.00	34.211	0.046	27.14	99.6	1.056	30.88	0.34	0.01	8.74
800	4.09	0.00	34.332	0.023	27.27	88.6	1.151	38.19	0.27	0.01	2.46

CNAV OSHAWA CRUISE OSI STATION 045 OBSERVED VALUES

COLUMBIA RIVER ENTRANCE

DATE 22/03/63 HR 22.0 LAT 46-14 N LONG 124-24 W SNOG 137 WEA 02 WIND VEL 25 DIR 35
 BAROM 08. TEMP DRY 10.6 WET 8.3 RELHU 73 WTRCLR SECDI SEA 2 DIR 36 SWELL 2 DIR 27
 CLOUD TYPE 6 AMT 7 VIS 7 WIRE ANGLE(S) 26

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
						MGA/L		
1	0	9.38	31.730	24.52	6.66	0.595	-0.027	105
1	5	9.38	31.729	24.52	6.66	0.595	-0.027	105
1	9	9.40	31.726	24.52	6.67	0.596	-0.029	105
1	18	9.38	31.747	24.54	6.69	0.598	-0.030	105
1	27	9.35	31.834	24.61	6.65	0.594	-0.027	105
1	45	8.53	32.181	25.01	6.14	0.548	0.028	95
1	68	8.99	32.739	25.37	4.98	0.445	0.124	78
1	90	8.57	33.358	25.92	3.85	0.344	0.228	60
1	135	7.38	33.926	26.54	2.26	0.202	0.383	34

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CNAV OSHAWA CRUISE OSI STATION 045				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.38	0.00	31.730	0.000	24.52	341.9	0.000	0.00	6.66	0.00	
10	9.40	0.00	31.726	0.000	24.52	342.7	0.035	0.02	6.67	0.00	0.97
20	9.38	0.01	31.761	0.000	24.55	340.1	0.069	0.07	6.69	0.00	0.75
30	9.21	0.05	31.881	0.004	24.67	328.7	0.103	0.16	6.60	0.01	0.93
50	8.60	0.07	32.293	0.001	25.08	289.4	0.165	0.41	5.91	0.02	0.79
75	8.91	0.03	32.944	0.011	25.55	246.1	0.233	0.83	4.61	0.01	0.67
100	8.25	0.06	33.605	0.026	26.16	187.8	0.287	1.32	3.38	0.02	2.25

CNAV OSHAWA CRUISE OSI STATION 046 OBSERVED VALUES

NORTH HEAD

DATE 22/03/63 HR 23.6 LAT 46-22 N LONG 124-18 W WEA 01 WIND VEL 25 DIR 36
 BAROM 06. TEMP DRY 8.9 WET 6.7 RELHU 73 WTRCLR SECDI 64 SEA 2 DIR 00 SWELL 2 DIR 28
 CLOUD TYPE 6 AMT 5 VIS 7 WIRE ANGLE(S) 35

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
1	0	9.59	28.795	22.21	6.87	0.614	-0.037	106
1	4	9.47	29.834	23.03	6.76	0.604	-0.030	105
1	8	9.32	31.771	24.57	6.74	0.602	-0.034	106
1	16	9.31	31.780	24.57	6.74	0.602	-0.034	106
1	25	9.31	31.784	24.58	6.68	0.597	-0.029	105
1	41	8.99	31.912	24.73	6.54	0.584	-0.012	102
1	57	9.11	32.830	25.43	5.04	0.450	0.116	79

CNAV OSHAWA CRUISE OSI STATION 046 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY
 LAB-I DECK-I

0	1.40
3	1.43
6	1.28
12	1.18

15.71 - WATER COLUMN VALUES

MESSANGER TIME 1337 INCOMING SOLAR RADIATION - AM 155 PM 163

CNAV OSHAWA			CRUISE 051		STATION 046		INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.59	0.00	28.795	0.000	22.21	563.2	0.000	0.00	6.87	0.00	
10	9.30	0.01	32.015	0.161	24.76	319.7	0.045	0.02	6.74	0.00	0.89
20	9.32	0.01	31.779	0.002	24.57	337.7	0.078	0.07	6.72	0.00	0.63
30	9.21	0.03	31.773	0.023	24.59	336.7	0.112	0.16	6.71	0.05	0.82
50	8.94	0.04	32.284	0.032	25.03	295.1	0.176	0.41	5.96	0.07	1.24

CNAV OSHAWA CRUISE 051 STATION 047 OBSERVED VALUES

DATE 23/03/63 HR 01.1 LAT 46-26 N LONG 124-30 W SNGD 124 WEA 02 WIND VEL 25 DIR 35
 BAROM 06. TEMP DRY 8.3 WET 6.1 RELHU 72 WTRCLR SEA 3 DIR 35 SWELL 2 DIR 29
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 28.27

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.11	31.894	24.69	6.68	0.597	-0.026	105	
1	4	9.17	31.891	24.68	6.61	0.590	-0.021	104	
1	9	9.19	31.895	24.68	6.75	0.603	-0.034	106	
1	18	9.21	31.895	24.68	6.66	0.595	-0.026	105	
1	27	9.21	32.000	24.76	6.32	0.564	0.004	99	
2	44	9.39	32.475	25.10	5.84	0.522	0.043	92	
2	66	8.98	33.155	25.70	4.11	0.367	0.200	65	
2	88	8.24	33.635	26.19	3.25	0.290	0.284	51	
2	106	7.74	33.864	26.44	2.59	0.231	0.349	40	

CNAV OSHAWA CRUISE OS1 STATION 047 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.11	0.00	31.894	0.000	24.69	325.7	0.000	0.00	6.68	0.00	
10	9.19	0.00	31.893	0.002	24.68	327.2	0.033	0.02	6.76	0.00	0.93
20	9.21	0.00	31.909	0.000	24.69	326.4	0.066	0.07	6.59	0.01	0.75
30	9.25	0.02	32.069	0.008	24.81	315.3	0.099	0.15	6.25	0.02	0.91
50	9.33	0.01	32.667	0.009	25.26	272.6	0.158	0.39	5.39	0.07	0.76
75	8.69	0.02	33.377	0.001	25.92	210.7	0.219	0.77	3.70	0.03	0.67
100	7.88	0.01	33.805	0.001	26.38	167.6	0.266	1.19	2.84	0.02	0.74

CNAV OSHAWA CRUISE OS1 STATION 048 OBSERVED VALUES

DATE 23/03/63 HR 03.5 LAT 46-36 N LONG 124-42 W SNDC 1006 WEA 02 WIND VEL 25 DIR 34 27
BAROM 05. TEMP DRY 7.2 WET 5.6 RELHU 79 WTRCLR SEA 2 DIR 32 SWELL 3 DIR 27
CLOUD TYPE VIS 7 WIRE ANGLE(S) 0.41

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SAIN
1	0	9.20	32.143	24.87	6.54	0.584	-0.016	103
1	5	9.21	32.142	24.87	6.63	0.592	-0.024	104
1	10	9.24	32.146	24.87	6.65	0.594	-0.026	105
1	19	9.27	32.173	24.89	6.64	0.593	-0.026	105
1	29	9.25	32.195	24.91	6.53	0.583	-0.016	103
1	48	9.37	32.468	25.10	6.39	0.571	-0.006	101
1	71	8.23	33.193	25.84	4.67	0.417	0.160	72
1	97	7.90	33.548	26.17	3.89	0.347	0.232	60
1	120	7.89	33.775	26.35	3.15	0.281	0.298	49
2	141	7.75	33.875	26.45	2.65	0.237	0.344	41
1	144	7.64	33.902	26.49	2.78	0.248	0.333	43
2	161	7.51	33.931	26.53	2.68	0.239	0.344	41
2	247	6.57	33.974	26.69	2.24	0.200	0.396	34
2	420	5.47	34.076	26.91	1.13	0.101	0.511	16
2	639	4.48		0.41	0.037			4
2	843	3.91	34.341	27.29	0.26	0.023	0.612	

CNAV OSHAWA			CRUISE OSI			STATION 048			INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	PGT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	9.20	0.00	32.143	0.000	24.87	308.6	0.000	0.00	6.54	0.00				
10	9.24	0.00	32.146	0.000	24.87	309.1	0.032	0.02	6.65	0.00				
20	9.27	0.00	32.174	0.001	24.89	307.7	0.063	0.06	6.63	0.00	0.88			
30	9.27	0.01	32.202	0.000	24.91	305.7	0.094	0.14	6.54	0.01	0.97			
50	9.28	0.03	32.530	0.011	25.16	282.0	0.153	0.38	6.25	0.04	0.90			
75	8.14	0.01	33.267	0.008	25.92	210.8	0.215	0.77	4.51	0.03	0.82			
100	7.90	0.01	33.583	0.001	26.20	184.3	0.265	1.21	3.79	0.00	0.82			
150	7.63	0.02	33.909	0.003	26.49	157.2	0.351	2.30	2.67	0.05	0.62			
200	7.10	0.03	33.961	0.007	26.61	146.8	0.427	3.67	2.48	0.01	1.73			
250	6.55	0.00	33.976	0.000	26.70	139.1	0.499	5.33	2.22	0.00	1.00			
300	6.16	0.03	34.004	0.001	26.77	132.8	0.568	7.27	1.89	0.03	0.87			
400	5.56	0.01	34.064	0.000	26.89	122.1	0.697	11.86	1.25	0.01	0.84			
500	5.06	0.00	34.127	0.002	27.00	112.3	0.815	17.31	0.79	0.01	3.72			
600	4.63	0.00	34.192	0.004	27.10	103.4	0.924	23.45	0.49	0.00	9.70			
700	4.28	0.00	34.256	0.005	27.19	95.5	1.024	30.15	0.32	0.01	10.90			
800	4.00	0.00	34.317	0.003	27.26	88.7	1.117	37.31	0.26	0.01	2.99			

CNAV OSHAWA CRUISE OSI STATION 049 OBSERVED VALUES

WILLAPA BAY ENTRANCE

DATE 23/03/63 HR 06.7 LAT 46-40 N LONG 124-21 W SNDC 77 WEA 02 WIND VEL 18 DIR 34
 BAROM 05. TEMP DRY 7.2 WET 5.6 RELHU 79 WTRCLR SECDI SEA 3 DIR 34 SWELL 2 DIR 29
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 7

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	9.36	29.494	22.79	6.74	0.602	-0.026	104	
1	5	9.26	29.585	22.87	6.79	0.606	-0.029	105	
1	10	9.23	31.178	24.12	6.66	0.595	-0.023	104	
1	20	9.19	31.713	24.54	6.54	0.584	-0.014	102	
1	30	9.29	32.023	24.77	5.93	0.530	0.038	93	
1	59	8.94	33.070	25.64	4.33	0.387	0.181	68	

CNAV OSHAWA			CRUISE OSI		STATION 049		INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.36	0.00	29.494	0.000	22.79	507.9	0.000	0.00	6.74	0.00	
10	9.23	0.00	31.178	0.000	24.12	380.9	0.045	0.02	6.66	0.00	
20	9.19	0.00	31.713	0.000	24.54	340.7	0.082	0.08	6.54	0.00	
30	9.29	0.00	32.023	0.000	24.77	319.3	0.115	0.16	5.93	0.00	
50	9.29	0.09	32.583	0.092	25.20	278.1	0.175	0.40	4.51	0.19	7.37

CNAV OSHAWA CRUISE OSI STATION 050 OBSERVED VALUES

MOCLIPS RIVER

DATE 23/03/63 HR 10.6 LAT 47-14 N LONG 124-28 W SNDC 51 WEA 02 WIND VEL 25 DIR 34 29
 BAROM 03. TEMP DRY 7.8 WET 6.7 RELHU 86 WTRCLR SECDI SEA 2 DIR 34 SWELL 2 DIR 29
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.02	28.757	22.26	6.75	0.603	-0.019	103	
1	5	8.68	31.302	24.30	6.58	0.588	-0.009	102	
1	10	8.68	31.548	24.49	6.63	0.592	-0.015	103	
1	20	8.68	31.519	24.47	6.65	0.594	-0.017	103	
1	30	8.68	31.658	24.58	6.54	0.584	-0.007	101	
1	45	8.72	32.349	25.11	5.84	0.522	0.052	91	

CNAV OSHAWA			CRUISE OSI		STATION 050		INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.02	0.00	28.757	0.000	22.26	557.9	0.000	0.00	6.75	0.00	
10	8.68	0.00	31.548	0.000	24.49	345.4	0.046	0.02	6.63	0.00	
20	8.68	0.00	31.519	0.000	24.47	347.7	0.081	0.07	6.65	0.00	
30	8.68	0.00	31.658	0.000	24.58	337.5	0.115	0.16	6.54	0.00	

CNAV OSHAWA										STATION 051				OBSERVED VALUES			
DATE	23/03/63	HR	12.0	LAT	47-14 N	LONG	124-42 W	WTRCLR	SEA 2 DIR 34	WIND VEL 22 DIR 34	SWELL 2 DIR 29						
BAROM	03.0	TEMP	DRY	7.8	WET	6.7	RELHU	86	SNDG	113	WEA	02					
CLOUD	TYPE	AMT	3	VIS	7	WIRE	ANGLE(S)	23	SECDI								
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	AOU	SATN									
1	0	8.60	31.830	24.72	6.66	0.595	-0.018	103									
1	5	8.63	31.834	24.72	6.61	0.590	-0.014	102									
1	9	8.67	31.856	24.73	6.65	0.594	-0.018	103									
1	18	8.66	31.829	24.71	6.60	0.589	-0.013	102									
1	27	8.68	31.862	24.74	6.61	0.590	-0.014	102									
1	46	8.27	32.208	25.07	5.64	0.504	0.076	87									
1	69	8.24	33.318	25.94	3.94	0.352	0.224	61									
1	92	8.03	33.672	26.25	3.31	0.296	0.282	51									

CNAV OSHAWA				CRUISE 051		STATION 051		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	8-60	0-00	31-830	0-000	24-72	323-1	0-000	0-00	6-66	0-00			
10	8-67	0-00	31-854	0-003	24-73	322-5	0-033	0-02	6-65	0-00	0-97		
20	8-67	0-00	31-830	0-001	24-71	324-4	0-066	0-07	6-61	0-01	0-75		
30	8-62	0-02	31-887	0-003	24-76	319-7	0-098	0-15	6-51	0-02	0-94		
50	8-25	0-02	32-401	0-036	25-22	276-5	0-158	0-39	5-33	0-04	0-82		
75	8-23	0-02	33-548	0-043	26-12	191-3	0-217	0-76	3-60	0-05	1-21		

CNAV OSHAWA CRUISE 051 STATION 052 OBSERVED VALUES

DATE 23/03/63 HR 14-4 LAT 47-14 N LONG 125-05 W SNRG 622 WEA 02 WIND VEL 20 DIR 32
 BAROM 02 TEMP DRY 7-2 WET 6-1 RELHU 85 WTRCLR SEA 3 DIR 32 SWELL 3 DIR 27
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 23,26,20

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		SATN	
					ML/L	MGA/L	AOU	
1	0	8-88	32-000	24-81	6-57	0-587	-0-014	102
1	5	8-88	32-047	24-85	6-57	0-587	-0-014	102
1	9	8-90	32-037	24-84	6-29	0-562	0-011	98
1	18	9-18	32-190	24-91	6-27	0-560	0-008	99
1	27	9-15	32-204	24-93	6-12	0-547	0-022	96
2	45	9-15	32-232	24-95	6-18	0-552	0-016	97
2	68	9-04	32-688	25-33	5-48	0-489	0-079	86
2	92	8-56	33-132	25-75	4-46	0-398	0-174	70
2	112	7-94	33-471	26-10	3-61	0-322	0-257	56
2	135	7-76	33-805	26-39	3-10	0-277	0-304	48
3	166	7-21	33-912	26-55	2-85	0-255	0-333	43
3	189	7-08	33-973	26-62	2-60	0-232	0-357	39
3	284	6-13	34-092	26-84	1-82	0-163	0-440	27
3	474	5-13	34-144	27-00	0-84	0-075	0-542	12
3	569	4-66	34-189	27-09	0-54	0-048	0-576	8

[illegible]

0	0.45	13.46	32.021
0		14.00	

MESSENGER TIME 0625
INCOMING SOLAR RADIATION - AM 142
PM 208

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT INTENSITY INSTEAD OF 100 PERCENT

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 052		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E (T)	SAL	E (S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E (O)	VAR. RATIO	
0	8.88	0.00	32.000	0.000	24.81	314.5	0.000	0.00	6.57	0.00		
10	8.93	0.01	32.051	0.006	24.85	311.6	0.032	0.02	6.27	0.02	0.97	
20	9.19	0.01	32.199	0.004	24.92	304.5	0.063	0.06	6.24	0.01	0.75	
30	9.15	0.00	32.199	0.007	24.93	304.2	0.094	0.14	6.13	0.02	0.93	
50	9.15	0.01	32.312	0.014	25.02	296.1	0.154	0.39	6.08	0.02	0.79	
75	8.93	0.00	32.821	0.000	25.45	255.6	0.224	0.83	5.20	0.01	0.72	
100	8.30	0.03	33.272	0.001	25.90	213.2	0.283	1.35	4.10	0.02	0.62	
150	7.49	0.03	33.883	0.015	26.49	157.2	0.376	2.52	2.95	0.03	0.73	
200	6.98	0.02	33.994	0.003	26.65	142.8	0.452	3.87	2.49	0.00	1.20	
250	6.49	0.04	34.065	0.006	26.77	131.8	0.521	5.46	2.06	0.01	1.15	
300	6.02	0.01	34.100	0.004	26.86	123.8	0.585	7.27	1.71	0.00	0.96	
400	5.44	0.04	34.135	0.012	26.96	115.3	0.706	11.59	1.15	0.01	0.94	
500	5.02	0.01	34.151	0.003	27.02	110.1	0.820	16.84	0.75	0.00	0.85	

CNAV OSHAWA CRUISE 051 STATION 053 OBSERVED VALUES									
DATE 23/03/63		HR 18.3	LAT 47-14 N	LONG 125-28 W	SEA 02	WIND VEL 15 DIR 31			
BAROM 07.2		TEMP DRY 7.8	WET 5.6	RELHU 72	WTRCLR	SDG 1737			
CLOUD TYPE		AMT 8	VIS 7	WIRE ANGLE(S) 16.26		SECDI	SWELL 2 DIR 30		
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN	
1	0	8.89	32.102	24.89	6.61	0.590	-0.018	103	
1	5	8.91	32.097	24.88	6.65	0.594	-0.022	104	
1	10	8.95	32.095	24.88	6.66	0.595	-0.023	104	
1	19	8.97	32.097	24.87	6.66	0.595	-0.024	104	
1	29	9.00	32.187	24.94	6.59	0.589	-0.018	103	
1	48	8.99	32.199	24.95	6.58	0.588	-0.017	103	
1	72	9.08	32.722	25.35	5.78	0.516	0.051	91	
1	96	8.11	33.482	26.09	4.36	0.389	0.188	67	
1	120	7.92	33.684	26.27	3.50	0.313	0.266	54	
1	144	7.70	33.835	26.42	3.03	0.271	0.311	47	
2	157	7.62	33.857	26.45	2.98	0.266	0.316	46	
2	181	7.38	33.946	26.56	2.77	0.247	0.338	42	
2	271	6.51	33.986	26.71	2.16	0.193	0.404	32	
2	454	5.16	34.116	26.98	0.87	0.078	0.539	13	
2	683	4.34	34.264	27.19	0.34	0.030	0.599	5	
2	914	3.73	34.377	27.34	0.26	0.023	0.615	4	
2	1376	2.77	34.499	27.53	0.56	0.050	0.604	8	

CNAV OSHAWA CRUISE 051 STATION 053 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.99	23.20		32.067
4	0.86	18.32		32.061
20	0.95	2.80		32.062
44	0.84	0.06		32.149

39.70 286.08 - WATER COLUMN VALUES

MESSANGER TIME 1021 INCOMING SOLAR RADIATION - AM 142 PM 208

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(D)	VAR RATIO
0	8.89	0.00	32.102	0.000	24.89	307.0	0.000	0.00	6.61	0.00	0.88
10	8.95	0.00	32.095	0.000	24.88	308.6	0.032	0.02	6.66	0.00	0.97
20	8.97	0.00	32.105	0.002	24.88	308.4	0.063	0.06	6.65	0.00	0.91
30	9.00	0.00	32.186	0.005	24.94	302.9	0.093	0.14	6.59	0.01	0.84
50	9.02	0.01	32.227	0.004	24.97	300.4	0.154	0.39	6.54	0.00	0.80
75	8.97	0.03	32.826	0.014	25.44	255.7	0.224	0.83	5.60	0.02	0.55
100	8.05	0.02	33.537	0.012	26.14	190.0	0.280	1.33	4.18	0.00	1.25
150	7.66	0.00	33.847	0.003	26.44	162.3	0.369	2.45	3.00	0.01	0.91
200	7.19	0.00	33.973	0.013	26.61	147.2	0.447	3.84	2.63	0.01	0.93
250	6.70	0.00	33.997	0.014	26.69	139.7	0.519	5.51	2.29	0.01	0.75
300	6.26	0.00	34.005	0.002	26.76	133.9	0.588	7.46	1.93	0.02	0.80
400	5.50	0.00	34.075	0.003	26.91	120.4	0.717	12.04	1.21	0.03	0.80
500	4.95	0.02	34.148	0.001	27.03	109.5	0.833	17.38	0.70	0.02	0.68
600	4.57	0.03	34.213	0.001	27.12	101.1	0.939	23.37	0.44	0.03	0.91
700	4.29	0.00	34.274	0.000	27.20	94.4	1.038	29.96	0.32	0.00	0.59
800	4.01	0.01	34.326	0.000	27.27	88.2	1.130	37.06	0.26	0.01	3.00
1000	3.54	0.01	34.410	0.000	27.39	78.1	1.298	52.54	0.30	0.02	3.17
1200	3.13	0.02	34.468	0.000	27.47	70.5	1.449	69.50	0.45	0.05	

CNAV OSHAWA CRUISE DS1 STATION 054 OBSERVED VALUES									
DATE 23/03/63		HR 21.6	LAT 47-14 N	LONG 125-50 W	SEA 02	WIND VEL 8 DIR 32	WIND VEL 31 DIR 30	WIND VEL 2 DIR 30	
BAROM 08		TEMP DRY 10.0	WET 6.7	RELHU 62	WTRCLR	SEA 1 DIR 31	SWELL 2 DIR 30		
CLOUD TYPE 6 AMT 8		VIS 7	WIRE ANGLE(S) 0, 0						
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.22	32.369	25.05	6.53	0.583	-0.016		103
1	5	9.25	32.367	25.04	6.58	0.588	-0.021		104
1	10	9.24	32.366	25.04	6.59	0.589	-0.022		104
1	20	9.25	32.368	25.04	6.54	0.584	-0.018		103
1	30	9.22	32.369	25.05	6.54	0.584	-0.017		103
1	50	9.22	32.379	25.06	6.59	0.589	-0.022		104
1	75	9.11	32.610	25.25	6.18	0.552	0.015		97
1	100	8.70	33.463	25.98	3.81	0.340	0.229		60
1	125	8.26	33.638	26.19	3.03	0.271	0.304		47
1	150	8.05	33.804	26.35	2.88	0.257	0.319		45
2	170	7.91	33.855	26.41	2.79	0.249	0.329		43
2	194	7.79	33.883	26.45	2.85	0.255	0.325		44
2	492	6.74	33.983	26.67	2.19	0.196	0.398		33
2	488	5.12	34.126	26.99	0.90	0.080	0.537		13
2	735	4.19	34.279	27.22	0.34	0.030	0.601		5
2	984	3.63	34.399	27.37	0.27	0.024	0.616		4
2	1484	2.55	34.531	27.57	0.75	0.067	0.590		10
2	1684	2.28	34.561	27.62	1.00	0.089	0.573		13

CNAV OSHAWA CRUISE OSI STATION 054 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 0.66
4 0.72
20 0.79
44 0.77

33.62 - WATER COLUMN VALUES

MESSENGER TIME 1333 INCOMING SOLAR RADIATION - AM 142 PM 208

DEPTH	CNAV OSHAWA	TEMP	E(T)	CRUISE OSI	E(S)	STATION 054	SIGMA-T	INTERPOLATED AND COMPUTED VALUES					VAR RATIO
								SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	
0		9.22	0.00	32.369	0.000	25.05	25.05	292.1	0.000	0.00	6.53	0.00	
10		9.24	0.00	32.366	0.000	25.04	25.04	292.8	0.030	0.02	6.59	0.00	
20		9.25	0.00	32.368	0.000	25.04	25.04	293.0	0.059	0.06	6.54	0.00	
30		9.22	0.00	32.369	0.000	25.05	25.05	292.6	0.089	0.14	6.54	0.00	
50		9.22	0.00	32.379	0.000	25.06	25.06	292.2	0.148	0.38	6.59	0.00	
75		9.11	0.00	32.610	0.000	25.25	25.25	273.9	0.219	0.83	6.18	0.00	
100		8.70	0.00	33.463	0.000	25.98	25.98	204.9	0.279	1.36	3.81	0.00	
150		8.05	0.00	33.804	0.000	26.35	26.35	171.0	0.374	2.56	2.88	0.00	
200		7.74	0.01	33.890	0.000	26.46	26.46	161.0	0.458	4.06	2.83	0.01	1.11
250		7.24	0.04	33.943	0.000	26.58	26.58	150.8	0.536	5.87	2.56	0.06	1.24
300		6.66	0.00	33.990	0.000	26.69	26.69	140.3	0.610	7.93	2.13	0.00	0.98
400		5.76	0.01	34.068	0.002	26.87	26.87	124.2	0.743	12.69	1.43	0.03	0.76
500		5.06	0.01	34.134	0.000	27.00	27.00	111.8	0.862	18.17	0.85	0.01	0.94
600		4.60	0.04	34.199	0.000	27.11	27.11	102.5	0.971	24.27	0.54	0.03	0.68
700		4.27	0.02	34.259	0.000	27.19	27.19	95.2	1.071	30.93	0.37	0.01	0.82
800		4.02	0.01	34.314	0.000	27.26	27.26	89.2	1.164	38.11	0.29	0.01	0.72
1000		3.59	0.00	34.405	0.000	27.38	27.38	79.0	1.334	53.77	0.28	0.00	0.98
1200		3.12	0.02	34.470	0.003	27.47	27.47	70.3	1.485	70.81	0.41	0.03	1.03
1500		2.52	0.00	34.534	0.000	27.58	27.58	60.4	1.684	98.24	0.77	0.00	0.94

CNAV OSHAWA										CRUISE 051				STATION 055				OBSERVED VALUES			
DATE 24/03/63		HR 01.5		LAT 47-14 N		LONG 126-25 W		WIND VEL 5 DIR 27		SEA 0 DIR 30		SNDG 2560		WEA 02		WIND VEL 5 DIR 27		SEA 0 DIR 30			
BAROM 12.3		TEMP DRY 8.3		WET 6.1		RELHU 72		WTRCLR		SNDG 2560		WEA 02		WIND VEL 5 DIR 27		SEA 0 DIR 30		WIND VEL 5 DIR 27			
CLOUD TYPE		AMT 4		VIS 7		WIRE ANGLE(S) 5.20		WIRE ANGLE(S) 5.20		SNDG 2560		WEA 02		WIND VEL 5 DIR 27		SEA 0 DIR 30		WIND VEL 5 DIR 27			
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	ADU	SATN													
1	0	9.38	32.396	25.04	6.56	0.586	-0.021	104													
1	5	9.43	32.396	25.04	6.54	0.584	-0.020	104													
1	10	9.38	32.396	25.04	6.64	0.593	-0.028	105													
1	20	9.32	32.393	25.05	6.58	0.588	-0.022	104													
1	30	9.29	32.397	25.06	6.53	0.583	-0.017	103													
1	50	9.28	32.401	25.06	6.58	0.588	-0.022	104													
1	75	9.24	32.680	25.29	5.80	0.518	0.047	92													
1	100	8.78	33.340	25.87	4.11	0.367	0.202	65													
1	124	8.05	33.426	26.05	3.98	0.355	0.223	61													
1	149	7.86	33.657	26.26	3.55	0.317	0.263	55													
2	165	7.71	33.757	26.36	3.34	0.298	0.283	51													
2	188	7.56	33.859	26.46	2.92	0.261	0.322	45													
2	282	6.58	33.993	26.70	2.08	0.186	0.411	31													
2	473	5.08	34.128	27.00	0.78	0.070	0.548	11													
2	959	3.53	34.382	27.36	0.30	0.027	0.615	4													
2	1453	2.63	34.561	27.59	0.65	0.058	0.598	9													
2	1751	2.23	34.577	27.64	1.12	0.100	0.563	15													
2	2048	1.89	34.524	27.62	1.44	0.129	0.540	19													
2	2347	1.78	34.660	27.74	1.73	0.155	0.516	23													

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 055		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0 10 20 30	9.38	0.00	32.396	0.000	25.04	292.5	0.000	0.00	6.56	0.00	0.90	
	9.38	0.00	32.396	0.000	25.04	292.7	0.030	0.02	6.64	0.00		
	9.32	0.00	32.393	0.000	25.05	292.2	0.059	0.06	6.58	0.00		
	9.29	0.00	32.397	0.000	25.06	291.6	0.089	0.14	6.53	0.00		
50 75 100 150	9.28	0.00	32.401	0.000	25.06	291.5	0.148	0.38	6.58	0.00	0.90	
	9.24	0.00	32.680	0.000	25.29	270.6	0.218	0.83	5.80	0.00		
	8.78	0.00	33.340	0.000	25.87	215.2	0.280	1.37	4.11	0.00		
	7.85	0.00	33.664	0.000	26.27	178.5	0.379	2.62	3.54	0.00		
200 250 300 400	7.45	0.01	33.890	0.008	26.50	156.9	0.463	4.13	2.77	0.02	1.22	
	6.94	0.03	33.975	0.015	26.64	144.4	0.539	5.87	2.28	0.05		
	6.41	0.00	34.010	0.002	26.74	135.6	0.610	7.86	1.93	0.00		
	5.58	0.01	34.088	0.006	26.91	120.5	0.739	12.47	1.21	0.00		
500 600 700 800	4.94	0.02	34.145	0.000	27.03	109.6	0.855	17.82	0.69	0.03	1.00	
	4.49	0.08	34.204	0.002	27.12	100.9	0.961	23.80	0.42	0.10		
	4.11	0.11	34.259	0.002	27.21	93.4	1.060	30.35	0.25	0.13		
	3.82	0.10	34.310	0.002	27.28	87.1	1.151	37.37	0.19	0.12		
1000 1200 1500 2000	3.44	0.00	34.402	0.001	27.39	77.5	1.317	52.70	0.30	0.00	0.89	
	3.03	0.02	34.486	0.005	27.49	68.0	1.435	69.29	0.38	0.01		
	2.56	0.00	34.565	0.002	27.60	58.5	1.657	95.84	0.72	0.01		
	1.94	0.00	34.587	0.011	27.67	51.8	1.938	146.02	1.39	0.00		

CNAV OSHAWA CRUISE 051 STATION 056 OBSERVED VALUES

DATE 24/03/63 HR 06.3 LAT 47-14 N LONG 126-59 W SNG 2560 WEA 01 WIND VEL 20 DIR 14
 BAROM 14.2 TEMP DRY 8.3 WET 6.7 RELHU 80 WTRCLR SECD1 SEA 2 DIR 14 SWELL 2 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 11, 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	AOU	SATN
2	0	8.91	32.425	25.14	6.60	0.589	-0.019	103
1	5	8.88	32.427	25.15	6.63	0.592	-0.021	104
1	10	8.93	32.435	25.14	6.66	0.595	-0.024	104
1	20	8.86	32.475	25.19	6.62	0.591	-0.020	104
1	29	8.84	32.422	25.15	6.61	0.590	-0.019	103
1	49	8.81	32.430	25.16	6.59	0.589	-0.017	103
1	74	8.80	32.429	25.16	6.66	0.595	-0.023	104
1	98	7.56	32.972	25.77	5.54	0.495	0.092	84
1	123	7.20	33.421	26.17	4.68	0.418	0.172	71
1	147	7.39	33.738	26.39	3.76	0.336	0.250	57

CNAV OSHAWA CRUISE 051 STATION 056 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.91	0.00	32.425	0.000	25.14	283.3	0.000	0.00	6.60	0.00	
10	8.93	0.00	32.435	0.000	25.14	283.1	0.029	0.02	6.66	0.00	
20	8.86	0.00	32.475	0.000	25.19	279.2	0.057	0.06	6.62	0.00	
30	8.84	0.00	32.420	0.001	25.15	283.1	0.086	0.13	6.61	0.00	0.99
50	8.82	0.01	32.425	0.004	25.15	282.9	0.143	0.37	6.60	0.01	0.95
75	8.75	0.01	32.447	0.004	25.18	280.6	0.214	0.82	6.62	0.01	0.94
100	7.50	0.00	33.012	0.000	25.81	221.4	0.277	1.38	5.47	0.01	0.89

CNAV OSHAWA CRUISE 051 STATION 057 OBSERVED VALUES
 DATE 24/03/63 HR 09.1 LAT 47-14 N LONG 127-23 W WEA 01 WIND VEL 15 DIR 16
 BAROM 13.0 TEMP DRY 7.8 WET 6.7 RELHU 86 WIRCLR SECDI 2560 SEA 1 DIR 14 SWELL 1 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 17.20
 CST DEPTH TEMP SAL SIGMA-T ML/L MGA/L OXYGEN AUU SATN
 1 0 8.80 32.405 25.14 6.62 0.591 -0.019 103
 1 5 8.86 32.404 25.13 6.60 0.589 -0.018 103
 1 10 8.87 32.402 25.13 6.66 0.595 -0.023 104
 1 19 8.90 32.436 25.15 6.60 0.589 -0.019 103
 1 29 8.84 32.402 25.13 6.83 0.610 -0.038 107
 1 48 8.81 32.414 25.15 6.67 0.596 -0.024 104
 1 72 8.86 32.430 25.15 6.60 0.589 -0.018 103
 1 96 8.82 32.421 25.15 6.59 0.589 -0.017 103
 1 119 8.83 32.431 25.16 6.54 0.584 -0.012 102
 1 143 7.72 32.819 25.63 5.86 0.523 0.062 89
 2 156 7.28 33.777 26.44 3.72 0.332 0.255 57
 2 180 7.13 33.876 26.54 3.32 0.297 0.292 50
 2 271 6.03 33.969 26.76 2.18 0.195 0.410 32
 2 460 4.89 34.100 27.00 0.95 0.085 0.536 14
 2 698 3.98 34.241 27.21 0.36 0.032 0.603 5
 2 938 3.43 34.366 27.36 0.31 0.028 0.616 4
 2 1422 2.58 34.507 27.55 0.74 0.066 0.591 10
 2 1714 2.17 34.559 27.63 1.20 0.107 0.557 16

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 057		INTERPOLATED AND COMPUTED VALUES							VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)				
0	8.80	0.00	32.405	0.000	25.14	283.2	0.000	0.00	6.62	0.00	0.88 0.97			
10	8.87	0.00	32.402	0.000	25.13	284.6	0.029	0.02	6.66	0.00				
20	8.90	0.00	32.434	0.002	25.15	282.8	0.058	0.06	6.62	0.01				
30	8.84	0.00	32.401	0.001	25.13	284.5	0.086	0.13	6.83	0.01				
50	8.81	0.00	32.416	0.000	25.15	283.4	0.143	0.37	6.66	0.00	0.91 0.84 0.78 0.55			
75	8.86	0.00	32.429	0.001	25.15	283.5	0.215	0.83	6.60	0.00				
100	8.86	0.03	32.409	0.008	25.14	285.4	0.287	1.47	6.60	0.01				
150	7.46	0.01	33.342	0.048	26.07	197.0	0.408	2.97	4.70	0.11				
200	6.91	0.03	33.916	0.012	26.60	147.6	0.495	4.50	3.03	0.01	1.26 0.91 0.94 0.75			
250	6.31	0.04	33.968	0.013	26.72	136.6	0.567	6.15	2.40	0.01				
300	5.79	0.03	33.992	0.001	26.80	129.0	0.634	8.04	1.92	0.02				
400	5.15	0.04	34.064	0.002	26.94	117.0	0.758	12.47	1.22	0.03				
500	4.70	0.01	34.125	0.000	27.04	108.3	0.871	17.71	0.79	0.01	0.83 0.68 0.99 0.62			
600	4.30	0.01	34.186	0.000	27.13	100.1	0.977	23.64	0.51	0.02				
700	3.97	0.00	34.242	0.000	27.21	93.1	1.074	30.15	0.36	0.00				
800	3.72	0.01	34.297	0.001	27.28	86.9	1.165	37.15	0.29	0.02				
1000	3.31	0.00	34.390	0.001	27.39	76.9	1.331	52.39	0.33	0.01	0.94 0.88 0.94			
1200	2.94	0.01	34.456	0.003	27.48	69.2	1.479	69.07	0.47	0.01				
1500	2.47	0.00	34.522	0.001	27.57	60.6	1.676	96.33	0.85	0.00				

CNAV OSHAWA CRUISE OSI STATION 058 OBSERVED VALUES

DATE 24/03/63 HR 12.9 LAT 47-12 N LONG 128-06 W WEA 02 WIND VEL 28 DIR 13
 BAROM 12.5 TEMP DRY 7.2 WET 6.1 RELHU 85 WTRCLR SEA 3 DIR 12 SWELL 3 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 23,34

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	O ₂ GEN	AOU	SATN
1	0	8.73	32.389	25.14	6.62	0.591	-0.018	103	
1	5	8.75	32.390	25.14	6.62	0.591	-0.018	103	
1	9	8.78	32.389	25.13	6.67	0.596	-0.023	104	
1	18	8.79	32.398	25.14	6.62	0.591	-0.019	103	
1	28	8.79	32.390	25.13	6.60	0.589	-0.017	103	
1	46	8.77	32.392	25.14	6.60	0.589	-0.017	103	
1	69	8.76	32.395	25.14	6.54	0.584	-0.011	102	
1	92	8.49	32.661	25.39	5.90	0.527	0.048	92	
1	115	7.46	33.354	26.08	4.24	0.379	0.208	65	
1	138	7.46	33.705	26.36	3.24	0.289	0.296	49	
2	170	7.28	33.818	26.47	2.42	0.216	0.371	37	
2	257	5.82	33.990	26.80	1.74	0.155	0.452	26	
2	434	4.86	34.097	27.00	0.83	0.074	0.548	12	
2	658	4.15	34.236	27.19	0.36	0.032	0.600	5	
2	884	3.66	34.355	27.33	0.27	0.024	0.615	4	
2	1340	2.71	34.486	27.52	0.54	0.048	0.607	7	
2	1614	2.26	34.552	27.61	0.96	0.086	0.577	13	

CNAV OSHAWA CRUISE OSI STATION 058 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
0	0.46	6.90	32.411
0		8.68	

MESSANGER TIME 0630 INCOMING SOLAR RADIATION - AM 139 PM 257

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT INTENSITY INSTEAD OF 100 PERCENT

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 058		INTERPOLATED AND COMPUTED VALUES						VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)			
0	8.73	0.00	32.389	0.000	25.14	283.4	0.000	0.00	6.62	0.00	0.97 0.78 0.93		
10	8.78	0.00	32.390	0.001	25.13	284.3	0.029	0.02	6.67	0.00			
20	8.79	0.00	32.397	0.001	25.14	284.0	0.058	0.06	6.61	0.00			
30	8.79	0.00	32.390	0.000	25.13	284.7	0.086	0.13	6.60	0.00			
50	8.78	0.01	32.383	0.006	25.13	285.3	0.144	0.37	6.61	0.01	0.82 0.72 0.67 0.70		
75	8.74	0.02	32.431	0.005	25.17	281.6	0.215	0.83	6.45	0.01			
100	8.12	0.07	32.897	0.029	25.63	238.4	0.281	1.41	5.34	0.06			
150	7.42	0.00	33.775	0.016	26.42	164.3	0.382	2.66	2.88	0.01			
200	6.82	0.08	33.893	0.004	26.59	148.2	0.461	4.07	2.05	0.08	1.01 0.86 0.90 0.78		
250	5.95	0.03	33.981	0.001	26.78	131.2	0.531	5.69	1.75	0.03			
300	5.45	0.07	34.031	0.010	26.88	121.9	0.595	7.48	1.47	0.00			
400	4.93	0.06	34.089	0.008	26.98	112.5	0.713	11.71	0.96	0.00			
500	4.61	0.01	34.139	0.001	27.06	106.2	0.824	16.80	0.63	0.01	0.74 0.73 0.78 0.60		
600	4.30	0.01	34.201	0.001	27.14	98.9	0.927	22.64	0.43	0.01			
700	4.05	0.01	34.260	0.000	27.21	92.6	1.024	29.09	0.32	0.01			
800	3.83	0.01	34.314	0.001	27.28	86.9	1.115	36.08	0.27	0.01			
1000	3.40	0.01	34.396	0.004	27.39	77.5	1.281	51.39	0.28	0.00	0.92 0.88 0.72		
1200	2.99	0.01	34.455	0.004	27.47	69.8	1.430	68.21	0.40	0.00			
1500	2.43	0.00	34.522	0.002	27.58	60.2	1.628	95.49	0.76	0.00			

CNAV OSHAWA CRUISE OSI STATION 059 OBSERVED VALUES
 DATE 24/03/63 HR 19-0 LAT 47-17 N LONG 129-05 W SNDG 2651 WEA 01 WIND VEL 22 DIR 14
 BAROM 08.9 TEMP DRY 8.9 WET 8.9 RELHU 99 WTRCLR SEA 3 DIR 14 SWELL 3 DIR 13
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 6, 0, --

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	8.79	32.406	25.14	6.62	0.591	-0.019	103	
1	5	8.81	32.405	25.14	6.64	0.593	-0.021	104	
1	10	8.82	32.405	25.14	6.62	0.591	-0.019	103	
1	20	8.84	32.408	25.14	6.66	0.595	-0.023	104	
1	30	8.81	32.506*	25.22	6.56	0.586	-0.014	102	
1	50	8.80	32.405	25.14	6.57	0.587	-0.015	103	
1	75	8.77	32.433	25.17	6.55	0.585	-0.012	102	
1	100	7.89	33.080	25.81	4.92	0.439	0.142	76	
1	124	7.01	33.386	26.17	4.65	0.415	0.177	70	
1	149	7.32	33.734	26.40	3.58	0.320	0.267	54	
2	175	7.32	33.832	26.48	3.22	0.288	0.299	49	
2	200	7.16	33.886	26.54	2.90	0.259	0.330	44	
3	294	6.03	33.992	26.77	1.92	0.171	0.433	28	

CNAV OSHAWA CRUISE OSI STATION 059 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.56	9.88	32.399
7	0.55	10.68	32.394
24	0.58	1.10	32.394
51	0.62	0.14	32.409
29.85		185.10	- WATER COLUMN VALUES

MESSANGER TIME 1206 INCOMING SOLAR RADIATION - AM 139 PM 257

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 059		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OX ₂ ML/L	E(O)	VAR RATIO	
0	8.79	0.00	32.406	0.000	25.14	283.0	0.000	0.00	6.62	0.00	1.10	
10	8.82	0.00	32.405	0.000	25.14	283.7	0.029	0.02	6.62	0.00		
20	8.84	0.00	32.408	0.000	25.14	283.9	0.058	0.06	6.66	0.00		
30	8.81	0.00	32.406	0.002	25.14	283.8	0.086	0.13	6.56	0.00		
50	8.80	0.00	32.405	0.000	25.14	284.0	0.143	0.37	6.57	0.00	0.95	
75	8.77	0.00	32.433	0.000	25.17	281.9	0.215	0.82	6.55	0.00		
100	7.89	0.00	33.080	0.000	25.81	221.6	0.278	1.38	4.92	0.00		
150	7.32	0.00	33.741	0.001	26.40	165.5	0.376	2.60	3.56	0.00		
200	7.16	0.00	33.886	0.000	26.54	153.2	0.456	4.04	2.90	0.00	52.44	
250	6.57	0.03	33.935	0.009	26.66	142.5	0.531	5.75	2.34	0.00		

CNAV OSHAWA				CRUISE OSI		STATION 060		OBSERVED VALUES	
DATE 25/03/63		HR 03.5	LAT 48-12 N	LONG 130-00 W	SEA 2 DIR 13	WIND VEL 8 DIR 13			
BAROM 11.0		TEMP DRY 9.4	WET 8.9	RELHU 94	WTRCLR	WEA			
CLOUD TYPE		AMT 2	VIS 7	WIRE ANGLE(S) 5.25					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN - MGA/L	AOU	SEC DI	SATN
1	0	8.38	32.406	25.21	6.59	0.589	-0.011	102	
1	5	8.36	32.408	25.21	6.65	0.594	-0.016	103	
1	10	8.40	32.412	25.21	6.66	0.595	-0.017	103	
1	20	8.38	32.401	25.20	6.63	0.592	-0.014	102	
1	30	8.32	32.414	25.22	6.52	0.582	-0.004	101	
1	50	8.30	32.409	25.22	6.62	0.591	-0.012	102	
1	75	8.24	32.445	25.26	6.46	0.577	0.003	100	
1	100	7.56	32.866	25.68	5.37	0.480	0.108	82	
1	124	6.58	33.352	26.20	4.97	0.444	0.155	74	
1	149	6.70	33.692	26.45	4.40	0.393	0.203	66	
2	163*	6.64	33.718	26.48	4.31	0.385	0.212	65	
2	187	6.74	33.886	26.60	3.92	0.350	0.244	59	
2	279	5.84	33.922	26.74	3.15	0.281	0.326	46	
2	1421	2.82	34.514	27.54	0.53	0.047	0.606	7	
2	1708	2.17	34.568	27.63	1.03	0.092	0.572	14	
2	2092	1.88	34.567*	27.66	1.39	0.124	0.545	19	
2	2380	1.76	34.630	27.72	1.72	0.154	0.517	23	

DEPTH	CNAV OSHAWA		CRUISE OS1		STATION 060		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	8.38	0.00	32.406	0.000	25.21	277.1	0.000	0.00	6.59	0.00	0.98	
10	8.40	0.00	32.412	0.000	25.21	277.1	0.028	0.01	6.66	0.00		
20	8.38	0.00	32.401	0.000	25.20	277.8	0.056	0.06	6.63	0.00		
30	8.32	0.00	32.414	0.000	25.22	276.1	0.084	0.13	6.52	0.00		
50	8.30	0.00	32.409	0.000	25.22	276.5	0.140	0.36	6.62	0.00		
75	8.24	0.00	32.445	0.000	25.26	273.4	0.209	0.80	6.46	0.00	0.98	
100	7.56	0.00	32.866	0.000	25.68	233.0	0.273	1.37	5.37	0.00		
150	6.70	0.00	33.700	0.001	26.46	160.3	0.372	2.59	4.38	0.00		
200	6.65	0.03	33.910	0.012	26.63	144.7	0.449	3.97	3.79	0.01		
250	6.19	0.05	33.944	0.022	26.72	137.0	0.520	5.60	3.36	0.02		
300	5.71	0.04	33.934	0.002	26.77	132.3	0.588	7.52	3.01	0.02	1.02	
400	5.15	0.23	33.993	0.014	26.88	122.3	0.716	12.11	2.39	0.09	1.19	
500	4.64	0.37	34.050	0.023	26.98	113.1	0.835	17.58	1.85	0.14	2.47	
600	4.19	0.48	34.105	0.029	27.08	104.8	0.945	23.79	1.39	0.18	3.99	
700	3.81	0.56	34.160	0.034	27.16	97.3	1.047	30.59	1.01	0.21	5.38	
800	3.48	0.60	34.213	0.036	27.23	90.5	1.142	37.90	0.70	0.23	6.38	
1000	3.02	0.56	34.315	0.034	27.36	79.1	1.314	53.68	0.32	0.21	6.82	
1200	2.79	0.37	34.412	0.023	27.46	70.7	1.466	70.78	0.25	0.14	5.86	
1500	2.62	0.01	34.532	0.001	27.57	61.7	1.667	98.57	0.65	0.02	3.17	
2000	1.91	0.02	34.602	0.001	27.68	50.4	1.952	149.23	1.32	0.01	0.61	

CNAV OSHAWA CRUISE OSI STATION 061 OBSERVED VALUES									
DATE 25/03/63		HR 09.1	LAT 48-14 N	LONG 129-18 W	SEA 02	WIND VEL 12 DIR 12	SEA 2 DIR 13	SWELL 4 DIR 13	
BAROM 11.0	TEMP DRY 8.9	WET 8.9	RELHU 99	WTRCLR	SNDG 2286	WEA 02	WIND VEL 12 DIR 12	SEA 2 DIR 13	SWELL 4 DIR 13
CLOUD TYPE	AMT 2	VIS 7	WIRE	ANGLE(S) 10.10	SECDI	SEA 2 DIR 13	WIND VEL 12 DIR 12	SEA 2 DIR 13	SWELL 4 DIR 13
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	AOU	SATN	
1	0	8.70	32.494	25.23	6.59	0.589	-0.015	103	
1	5	8.74	32.489	25.22	6.52	0.582	-0.010	102	
1	10	8.74	32.492	25.22	6.59	0.589	-0.016	103	
1	20	8.73	32.490	25.22	6.59	0.589	-0.016	103	
1	30	8.69	32.498	25.23	6.57	0.587	-0.013	102	
1	50	8.67	32.502	25.24	6.60	0.589	-0.016	103	
1	75	8.67	32.506	25.24	6.56	0.586	-0.012	102	
1	99	8.43	32.604	25.35	6.34	0.566	0.010	98	
1	124	7.17	32.945	25.80	5.69	0.508	0.091	85	
1	149	6.57	33.422	26.26	4.99	0.446	0.151	75	
2	171	6.65	33.629	26.41	4.14	0.370	0.225	62	
2	195	6.72	33.828	26.56					
2	294	5.70	33.927	26.76	3.06	0.273	0.336	45	
2	493	4.23	34.050	27.03	1.38	0.123	0.509	20	
2	741	3.78	34.246	27.23	0.45	0.040	0.598	6	
2	988	3.30	34.384	27.39	0.29	0.026	0.620	4	
2	1486	2.49	34.477	27.53	0.76	0.068	0.591	10	
2	1786	2.10	34.568	27.64	1.13	0.101	0.564	15	

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 061		INTERPOLATED AND COMPUTED VALUES						VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)			
0 10 20 30	8.70	0.00	32.494	0.000	25.23	275.1	0.000	0.00	6.59	0.00	0.99 0.93		
	8.74	0.00	32.492	0.000	25.22	276.0	0.028	0.01	6.59	0.00			
	8.73	0.00	32.490	0.000	25.22	276.2	0.056	0.06	6.59	0.00			
	8.69	0.00	32.498	0.000	25.23	275.2	0.084	0.13	6.57	0.00			
50 75 100 150	8.67	0.00	32.502	0.000	25.24	274.9	0.139	0.36	6.60	0.00	0.99 0.93		
	8.67	0.00	32.506	0.000	25.24	275.1	0.209	0.80	6.56	0.00			
	8.38	0.01	32.614	0.001	25.37	263.3	0.276	1.41	6.33	0.00			
	6.57	0.00	33.434	0.001	26.27	178.4	0.388	2.78	5.66	0.00			
200 250 300 400	6.69	0.02	33.847	0.009	26.57	149.9	0.470	4.25	4.04	0.03	1.09 1.27 0.99 0.77		
	6.27	0.09	33.956	0.047	26.72	137.0	0.543	5.92	3.29	0.15			
	5.64	0.00	33.931	0.001	26.77	131.7	0.610	7.83	3.00	0.00			
	4.81	0.01	33.997	0.005	26.92	118.0	0.736	12.32	2.07	0.01			
500 600 700 800	4.21	0.01	34.056	0.000	27.04	107.8	0.850	17.57	1.34	0.00	0.97 0.68 0.80 0.73		
	3.94	0.06	34.135	0.004	27.13	99.8	0.955	23.48	0.85	0.02			
	3.80	0.04	34.214	0.002	27.20	93.2	1.053	29.98	0.53	0.01			
	3.65	0.00	34.284	0.000	27.27	87.3	1.144	37.01	0.37	0.02			
1000 1200 1500	3.28	0.00	34.387	0.001	27.39	76.8	1.310	52.27	0.29	0.00	0.99 0.90 1.00		
	2.93	0.00	34.434	0.013	27.46	70.7	1.459	69.13	0.41	0.04			
	2.47	0.00	34.479	0.001	27.54	63.8	1.664	97.42	0.78	0.00			

CNAV OSHAWA CRUISE 051 STATION 062 OBSERVED VALUES									
DATE 25/03/63		HR 14.2	LAT 48-14 N	LONG 128-30 W	SEA 01	WIND VEL 15 DIR 15	SEA 2 DIR 15	SWELL 4 DIR 13	
BAROM 11.2	TEMP DRY 8.9	WET 8.3	RELHU 92	WTRCLR	SECDI				
CLOUD TYPE	VIS 7	WIRE ANGLE(S)	17.18						
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN	
					ML/L	MGA/L			
1	0	8.90	32.432	25.15	6.51	0.581	-0.011	102	
1	5	8.93	32.424	25.14	6.53	0.583	-0.013	102	
1	10	8.96	32.431	25.14	6.59	0.589	-0.019	103	
1	19	8.98	32.434	25.14	6.43	0.574	-0.005	101	
1	29	8.94	32.424	25.13	6.51	0.581	-0.011	102	
1	48	8.92	32.426	25.14	6.55	0.585	-0.014	103	
1	72	8.83	32.421	25.15	6.55	0.585	-0.013	102	
1	96	8.50	32.656	25.38	5.26	0.470	0.105	82	
1	119	7.40	33.179	25.95	5.02	0.448	0.140	76	
1	143	7.36	33.516	26.22	4.27	0.381	0.206	65	
2	164	7.16	33.664	26.37	4.18	0.373	0.216	63	
2	187	7.23	33.854	26.51	3.12	0.279	0.309	47	
2	280	6.03	33.942	26.74	2.89	0.258	0.346	43	
2	470	4.85	34.068	26.98	0.97	0.087	0.535	14	
2	710	4.14	34.252	27.20	0.30	0.027	0.606	4	
2	950	3.58	34.372	27.35	0.28	0.025	0.616	4	
2	1434	2.59	34.459*	27.51	0.64	0.057	0.600	9	
2	1724	2.18	34.562	27.63	1.09	0.097	0.566	15	

CNAV OSHAWA CRUISE OSI STATION 062 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.39	7.28	32.418
0		8.74	

MESSENGER TIME 0625 INCOMING SOLAR RADIATION - AM 231 PM 182

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT INTENSITY INSTEAD OF 100 PERCENT

CNAV OSHAWA			CRUISE OSI			STATION 062			INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0 10 20 30	8.90	0.00	32.432	0.000	25.15	282.7	0.000	0.00	6.51	0.00			
	8.96	0.00	32.431	0.000	25.14	283.8	0.029	0.02	6.59	0.00			
	8.98	0.00	32.433	0.000	25.14	284.1	0.058	0.06	6.43	0.00	0.88		
	8.94	0.00	32.424	0.000	25.13	284.4	0.086	0.13	6.51	0.00	0.97		
50 75 100 150	8.92	0.00	32.421	0.003	25.14	284.6	0.144	0.37	6.58	0.02	0.91		
	8.82	0.01	32.435	0.001	25.16	282.5	0.215	0.83	6.39	0.04	0.84		
	8.30	0.04	32.744	0.012	25.48	252.5	0.282	1.43	5.20	0.03	0.78		
	7.29	0.02	33.572	0.006	26.28	177.6	0.391	2.77	4.26	0.03	0.66		
200 250 300 400	7.12	0.06	33.900	0.022	26.56	151.7	0.474	4.25	2.91	0.14	1.23		
	6.52	0.10	33.974	0.039	26.70	139.0	0.547	5.93	2.63	0.25	1.07		
	5.85	0.02	33.957	0.001	26.77	132.4	0.615	7.86	2.70	0.05	0.96		
	5.15	0.05	34.025	0.003	26.91	120.0	0.743	12.41	1.72	0.12	0.75		
500 600 700 800	4.73	0.01	34.092	0.002	27.01	111.1	0.859	17.78	0.81	0.02	0.86		
	4.40	0.03	34.170	0.004	27.11	102.4	0.967	23.86	0.45	0.05	0.67		
	4.16	0.00	34.245	0.001	27.19	95.0	1.067	30.51	0.30	0.01	0.94		
	3.92	0.00	34.302	0.00	27.26	88.8	1.160	37.66	0.25	0.02	0.64		
1000 1200 1500	3.46	0.00	34.391	0.002	27.38	78.6	1.329	53.25	0.29	0.00	1.67		
	3.03	0.01	34.451	0.010	27.47	70.7	1.481	70.29	0.40	0.00	7.31		
	2.48	0.00	34.514	0.016	27.57	61.4	1.681	98.01	0.73	0.00	9.56		

CNAV OSHAWA CRUISE 051 STATION 063 OBSERVED VALUES									
DATE 25/03/63		HR 18.8	LAT 48-14 N	LONG 128-00 W	WEA 01	WIND VEL 10 DIR 17	SEA 2 DIR 18	SWELL 3 DIR 18	
BAROM 16.	TEMP DRY 9.4	WET 8.9	RELHU 94	WTRCLR	SNDG 2560	SECDI			
CLOUD TYPE	AMT 1	VIS 7	WIRE ANGLE(S)	0.14					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	8.73	32.300	25.07	6.63	0.592	-0.019		103
1	5	8.71	32.282	25.06	6.62	0.591	-0.017		103
1	10	8.80	32.327	25.08	6.74	0.602	-0.029		105
1	20	8.76	32.335	25.09	6.73	0.601	-0.028		105
1	30	8.71	32.338	25.10	6.58	0.588	-0.014		102
1	50	8.70	32.350	25.11	6.60	0.589	-0.016		103
1	75	8.68	32.382	25.14	6.60	0.589	-0.016		103
1	100	8.11	33.199	25.87	4.49	0.401	0.177		69
1	125	7.63	33.808	26.41	2.47	0.221	0.362		38
1	150	7.57	33.871	26.47	2.20	0.196	0.386		34
2	168	7.48	33.880	26.49	2.29	0.205	0.380		35
2	289*	6.86	33.962	26.64	2.18	0.195	0.398		33
2	483*	5.34	34.056	26.91	1.20	0.107	0.507		17
2	727	4.19	34.250	27.19	0.31	0.028	0.604		4
2	970	3.56	34.405	27.38	0.27	0.024	0.617		4
2	1458	2.58	34.472*	27.52	0.69	0.062	0.596		9
2	1752	2.17	34.442*	27.53	1.07	0.096	0.569		14

CNAV OSHAWA CRUISE OS1 STATION 063 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I DECK-I	SAL
0	0.68	16.28	32.200
7	0.72	13.78	32.197
24	0.86	2.40	32.220
51	0.37	0.00	32.334

34.92 275.14 - WATER COLUMN VALUES

MESSENGER TIME 1041 INCOMING SOLAR RADIATION - AM 231 PM 182

CNAV OSHAWA CRUISE OS1 STATION 063				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.73	0.00	32.300	0.000	25.07	290.0	0.000	0.00	6.63	0.00	
10	8.80	0.00	32.327	0.000	25.08	289.2	0.030	0.02	6.74	0.00	
20	8.76	0.00	32.335	0.000	25.09	288.2	0.059	0.06	6.73	0.00	
30	8.71	0.00	32.338	0.000	25.10	287.4	0.088	0.13	6.58	0.00	
50	8.70	0.00	32.350	0.000	25.11	286.6	0.146	0.37	6.60	0.00	
75	8.68	0.00	32.382	0.000	25.14	284.4	0.217	0.83	6.60	0.00	
100	8.11	0.00	33.199	0.000	25.87	215.9	0.280	1.39	4.49	0.00	
150	7.57	0.00	33.871	0.000	26.47	159.2	0.375	2.57	2.20	0.00	
200	7.27	0.03	33.899	0.002	26.54	153.8	0.454	3.98	2.27	0.11	3.77
250	6.95	0.07	33.929	0.004	26.60	147.9	0.530	5.73	2.21	0.25	11.19
300	6.63	0.11	33.960	0.006	26.67	142.1	0.603	7.80	2.12	0.36	19.77
400	6.02	0.14	34.024	0.008	26.80	130.7	0.741	12.72	1.87	0.48	31.94
500	5.43	0.14	34.090	0.008	26.93	119.6	0.867	18.53	1.51	0.48	30.31
600	4.87	0.10	34.159	0.006	27.05	108.7	0.982	25.02	1.05	0.35	16.15
700	4.33	0.03	34.230	0.001	27.16	98.0	1.087	31.98	0.48	0.09	2.00
800	3.97	0.01	34.300	0.001	27.25	89.5	1.181	39.27	0.26	0.01	99.99
1000	3.49	0.00							0.28	0.00	0.97
1200	3.05	0.00							0.41	0.02	0.89
1500	2.51	0.00							0.74	0.00	11.79

CNAV OSHAWA										CRUISE OS1				STATION 064				OBSERVED VALUES			
DATE 25/03/63		HR 22.3		LAT 48-15 N		LONG 127-32 W		SEA 03		WIND VEL 3 DIR 15		WIND VEL 3 DIR 18		WIND VEL 3 DIR 18		WIND VEL 3 DIR 18					
BAROM 17		TEMP DRY 11.7		WEI 10.0		RELHU 81		WTRCLR		SNDG 2560		SEA 2		DIR 18		DIR 18					
CLOUD TYPE 6		AMT 4		VIS 7		WIRE ANGLE(S)		0.20		SECDI		SWELL		3		18					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN												
1	0	8.83	32.140	24.93	6.64	0.593	-0.020	104													
1	5	9.07	32.417	25.11	6.64	0.593	-0.024	104													
1	10	9.00	32.414	25.12	6.68	0.597	-0.027	105													
1	20	8.91	32.422	25.14	6.66	0.595	-0.024	104													
1	30	8.88	32.427	25.15	6.65	0.594	-0.023	104													
1	50	8.85	32.424	25.15	6.68	0.597	-0.025	104													
1	75	8.86	32.418	25.14	6.58	0.588	-0.016	103													
1	100	8.04	33.161	25.85	4.62	0.413	0.167	71													
1	125	7.76	33.550	26.19	3.41	0.305	0.277	52													
1	150	7.59	33.817	26.43	2.89	0.258	0.325	44													
2	163	7.57	33.820	26.43	2.84	0.254	0.329	44													
2	186	7.32	33.896	26.53	2.68	0.239	0.347	41													
2	279	6.08	33.939	26.73	2.54	0.227	0.377	38													
2	471	4.90	34.091	26.99	0.86	0.077	0.544	12													
2	713	4.14	34.277	27.22	0.34	0.030	0.602	5													
2	957	3.60	34.390	27.36	0.28	0.025	0.615	4													
2	1448	2.57	34.508	27.55	0.65	0.058	0.599	9													
2	1744	2.23	34.560	27.62	1.00	0.089	0.573	13													

DEPTH	CNAV OSHAWA			CRUISE OSI			STATION 064			INTERPOLATED AND COMPUTED VALUES						VAR RATIO
	TEMP	E(T)		SAL	E(S)		SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)				
0	8.83	0.00		32.140	0.000		24.93	303.3	0.000	0.00	6.64	0.00				
10	9.00	0.00		32.414	0.000		25.12	285.6	0.030	0.02	6.68	0.00				
20	8.91	0.00		32.422	0.000		25.14	283.9	0.059	0.06	6.66	0.00				
30	8.88	0.00		32.427	0.000		25.15	283.2	0.087	0.13	6.65	0.00				
50	8.85	0.00		32.424	0.000		25.15	283.3	0.144	0.37	6.68	0.00				
75	8.86	0.00		32.418	0.000		25.14	284.3	0.216	0.83	6.58	0.00				
100	8.04	0.00		33.161	0.000		25.85	217.7	0.279	1.38	4.62	0.00				
150	7.59	0.00		33.817	0.000		26.43	163.5	0.375	2.58	2.89	0.00				
200	7.13	0.02		33.909	0.005		26.56	151.1	0.455	4.00	2.65	0.03	1.24			
250	6.46	0.03		33.937	0.009		26.68	140.9	0.528	5.69	2.56	0.04	1.05			
300	5.89	0.02		33.954	0.001		26.76	133.1	0.597	7.64	2.37	0.05	0.96			
400	5.20	0.05		34.030	0.003		26.91	120.1	0.725	12.20	1.53	0.12	0.76			
500	4.78	0.01		34.115	0.001		27.02	109.9	0.841	17.55	0.74	0.02	0.87			
600	4.43	0.02		34.195	0.003		27.12	100.8	0.947	23.54	0.44	0.05	0.67			
700	4.17	0.00		34.268	0.000		27.21	93.3	1.046	30.08	0.34	0.01	0.92			
800	3.93	0.01		34.324	0.001		27.28	87.4	1.137	37.11	0.28	0.01	0.65			
1000	3.50	0.01		34.404	0.001		27.38	78.0	1.304	52.51	0.29	0.01	0.96			
1200	3.05	0.02		34.460	0.004		27.47	70.1	1.454	69.42	0.41	0.02	0.89			
1500	2.49	0.00		34.517	0.000		27.57	61.2	1.654	97.00	0.71	0.00	1.42			

CNAV OSHAWA CRUISE 051 STATION 065 OBSERVED VALUES

DATE 26/03/63 HR 01-8 LAT 48-14 N LONG 127-03 W SNOG 2560 WEA 03 WIND VEL 10 DIR 13
 BAROM 18.1 TEMP DRY 10.0 WET 9.4 REL HU 93 WTR CLR SEA 2 DIR 13 SWELL 4 DIR 14
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 2

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN ADU	SATN
1	0	8.82	32.239	24.99	6.62	0.597	-0.020	103
1	5	8.83	32.238	25.01	6.68	0.597	-0.024	104
1	10	8.67	32.238	25.03	6.66	0.595	-0.020	104
1	20	8.65	32.240	25.04	6.68	0.597	-0.022	104
1	30	8.63	32.236	25.04	6.64	0.593	-0.018	103
1	50	8.58	32.248	25.05	6.62	0.591	-0.015	103
1	75	8.56	32.512	25.26	6.22	0.556	0.019	97
1	100	7.86	33.269	25.96	4.50	0.402	0.179	69
1	125	7.53	33.594	26.26	3.77	0.337	0.248	58
1	150	7.23	33.801	26.46	3.49	0.312	0.276	53

CNAV OSHAWA CRUISE 051 STATION 065 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.92	0.00	32.239	0.000	24.99	297.3	0.000	0.00	6.62	0.00	
10	8.67	0.00	32.238	0.000	25.03	293.9	0.030	0.02	6.66	0.00	
20	8.65	0.00	32.240	0.000	25.04	293.6	0.060	0.06	6.68	0.00	
30	8.63	0.00	32.236	0.000	25.04	293.8	0.089	0.14	6.64	0.00	
50	8.58	0.00	32.248	0.000	25.05	292.5	0.149	0.38	6.62	0.00	
75	8.56	0.00	32.512	0.000	25.26	273.0	0.220	0.83	6.22	0.00	
100	7.86	0.00	33.269	0.000	25.96	207.2	0.280	1.37	4.50	0.00	
150	7.23	0.00	33.801	0.000	26.46	159.8	0.373	2.52	3.49	0.00	

CNAV OSHAWA										CRUISE OSI			STATION 066		OBSERVED VALUES				
DATE 26/03/63		HR 04.0	LAT 48-14 N	LONG 126-35 W	WEA 02	WIND VEL 15 DIR 12	SEA 2	DIR 13	SWELL 4 DIR 14										
BAROM 18.	TEMP DRY 8.3	WET 8.3	RELHU 99	WTRCLR	SNDG 2377	SEC DI													
CLOUD TYPE	AMT 8	VIS 7	WIRE ANGLE(S) 15.26																
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ML/L	MGA/L	AOU	SATN									
1	0	9.02	32.230	24.97	5.25	0.469	0.101			82									
1	5	9.05	32.227	24.96	4.56	0.407	0.162			71									
1	10	9.05	32.235	24.97	4.74	0.423	0.147			74									
1	19	9.00	32.249	24.99	5.55	0.496	0.075			87									
1	29	8.98	32.264	25.00	5.90	0.527	0.043			92									
1	48	8.88	32.365	25.10	5.60	0.500	0.071			88									
1	72	8.75	32.766	25.43	5.05	0.451	0.120			79									
1	97	8.02	33.130	25.83	4.52	0.404	0.176			70									
1	121	7.85	33.646	26.25	2.63*	0.235	0.345			41									
1	145	7.52	33.809	26.43	2.75*	0.246	0.338			42									
2	160	7.44	33.827	26.46	3.37	0.301	0.284			51									
2	179	7.11	33.874	26.54	3.43	0.306	0.283			52									
2	269	6.41	33.968	26.71	2.33	0.208	0.391			35									
2	453	4.82			1.08	0.096													
2	685	4.25	34.238	27.18	0.38	0.034	0.597			5									
2	919	3.61	34.262*	27.26	0.31	0.028	0.613			4									
2	1200	3.12	34.457	27.46	0.39	0.035	0.613			5									
2	1671	2.37	34.553	27.61	0.86	0.077	0.584			12									
2	1954	2.04	34.584	27.66	1.25	0.112	0.554			17									
2	2170	1.85	34.630	27.71	1.38	0.123	0.546			18									

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 066		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	9.02	0.00	32.230	0.000	24.97	299.4	0.000	0.00	5.25	0.00	0.88 0.97	
10	9.05	0.00	32.235	0.000	24.97	299.7	0.031	0.02	4.74	0.00		
20	9.00	0.00	32.250	0.000	24.99	298.0	0.061	0.06	5.61	0.00		
30	8.98	0.00	32.266	0.001	25.01	296.6	0.091	0.14	5.90	0.01	0.91 0.86 1.00 1.15	
50	8.88	0.01	32.394	0.004	25.12	286.0	0.149	0.38	5.56	0.00		
75	8.66	0.02	32.806	0.004	25.48	252.6	0.217	0.81	4.98	0.00		
100	7.99	0.01	33.200	0.009	25.88	214.1	0.276	1.33	4.44	0.01	1.53 1.02 1.17 1.56	
150	7.50	0.01	33.818	0.003	26.44	162.2	0.371	2.52	3.47	0.04		
200	6.89	0.04	33.906	0.006	26.59	148.1	0.449	3.91	3.26	0.08		
250	6.50	0.04	33.958	0.005	26.69	139.9	0.522	5.58	2.64	0.07	1.45 1.02 0.96 0.78	
300	6.11	0.03	33.994	0.002	26.77	132.8	0.590	7.52	2.05	0.02		
400	5.24	0.04	34.072	0.007	26.93	117.4	0.717	12.02	1.34	0.02		
500	4.64	0.04	34.140	0.008	27.06	106.4	0.830	17.22	0.87	0.01	0.73 0.84 2.56	
600	4.37	0.06	34.197	0.005	27.13	100.0	0.934	23.10	0.54	0.01		
700	4.21	0.00	34.246	0.000	27.19	95.4	1.033	29.69	0.36	0.01		
800	3.93	0.01	34.298	0.000	27.26	89.2	1.126	36.88	0.30	0.02	0.73 0.84 2.56	
1000	3.45	0.01	34.387	0.000	27.38	78.8	1.296	52.51	0.32	0.00		
1200	3.12	0.00	34.457	0.000	27.46	71.1	1.448	69.63	0.39	0.00		
1500	2.62	0.01	34.527	0.001	27.56	62.0	1.650	97.59	0.65	0.01	0.84 2.56	
2000	2.00	0.00	34.591	0.000	27.67	52.2	1.940	149.33	1.30	0.00		

CNAV OSHAWA CRUISE 051 STATION 067 OBSERVED VALUES									
DATE 26/03/63		HR 08.0	LAT 48-14 N	LONG 126-06 W	SEA 01	WIND VEL 15 DIR 12	SEA 2 DIR 12	SWELL 3 DIR 14	
BAROM 18.		TEMP DRY 7.8	WET 7.2	RELHU 92	WTRCLR	SNDG 1372	SECDI		
CLOUD TYPE		AMT 5	VIS 7	WIRE ANGLE(S) 10.20					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	AOU	SATN	
1	0	8.78	31.910	24.76	6.65	0.595	-0.020	104	
1	5	8.84	31.902	24.74	6.69	0.598	-0.024	104	
1	10	8.84	31.907	24.75	6.71	0.599	-0.026	104	
1	20	8.79	31.908	24.75	6.73	0.601	-0.027	105	
1	30	8.81	32.122	24.92	6.63	0.592	-0.019	103	
1	49	8.72	32.330	25.10	6.51	0.581	-0.008	101	
1	74	8.44	32.637	25.38	5.86	0.523	0.053	91	
1	99	8.25	33.218	25.86	4.59	0.410	0.166	71	
1	124	7.99	33.538	26.15	3.71	0.331	0.247	57	
1	149	7.39	33.802	26.44	3.55	0.317	0.268	54	
2	162	7.32	33.838	26.48	3.48	0.311	0.276	53	
2	186	7.01	33.900	26.57	3.19	0.285	0.306	48	
2	280	6.36	34.033	26.76	1.98	0.177	0.423	30	
2	472	5.21	34.100	26.96	0.93	0.083	0.533	13	
2	713	4.21	34.256	27.19	0.36	0.032	0.599	5	
2	1041	3.51	34.409	27.39	0.35	0.031	0.611	5	

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 067		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	8.78	0.00	31.910	0.000	24.76	319.7	0.000	0.00	6.66	0.00		
10	8.84	0.00	31.907	0.000	24.75	321.0	0.033	0.02	6.71	0.00		
20	8.79	0.00	31.908	0.000	24.75	320.3	0.065	0.07	6.73	0.00		
30	8.81	0.00	32.122	0.000	24.92	304.9	0.097	0.15	6.63	0.00		
50	8.71	0.00	32.339	0.002	25.10	287.6	0.156	0.39	6.50	0.00	0.95	
75	8.43	0.00	32.660	0.003	25.40	260.2	0.225	0.83	5.81	0.01	0.94	
100	8.24	0.00	33.234	0.001	25.87	215.3	0.285	1.36	4.54	0.00	0.94	
150	7.38	0.00	33.806	0.001	26.45	161.5	0.380	2.54	3.55	0.00	0.87	
200	6.88	0.02	33.927	0.002	26.61	146.5	0.458	3.93	3.00	0.01	1.22	
250	6.52	0.03	34.004	0.004	26.72	136.7	0.529	5.57	2.35	0.02	1.04	
300	6.23	0.00	34.045	0.005	26.79	130.5	0.596	7.47	1.81	0.02	0.96	
400	5.61	0.00	34.088	0.013	26.90	120.8	0.723	12.01	1.18	0.05	0.75	
500	5.07	0.00	34.117	0.002	26.99	113.2	0.841	17.46	0.83	0.01	0.88	
600	4.62	0.00	34.180	0.005	27.09	104.2	0.951	23.64	0.55	0.01	0.64	
700	4.25	0.00	34.247	0.001	27.18	95.9	1.052	30.38	0.37	0.00	0.91	
800	3.96	0.00	34.312	0.006	27.27	88.5	1.146	37.56	0.30	0.02	1.64	
1000	3.56	0.00	34.402	0.005	27.38	78.9	1.315	53.15	0.33	0.02	0.91	

CNAV OSHAWA CRUISE 051 STATION 068 OBSERVED VALUES

DATE 26/03/63 HR 11.5 LAT 48-14 N LONG 125-37 W SNDG 155 WEA 01 WIND VEL 13 DIR 10
 BAROM 17.0 TEMP DRY 8.9 WET 8.9 RELHU 99 WTRCLR SECDI SEA 1 DIR 09 SWELL 1 DIR 12
 CLOUD TYPE AMT 3 VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					ML/L	MGA/L		
1	0	8.66	31.872	24.75	6.54	0.584	-0.008	101
1	5	8.68	31.876	24.75	6.57	0.587	-0.011	102
1	10	8.74	31.868	24.73	6.60	0.589	-0.014	102
1	20	8.70	31.876	24.74	6.59	0.589	-0.013	102
1	30	8.51	31.929	24.81	6.55	0.585	-0.007	101
1	50	8.52	32.599	25.34	5.86	0.523	0.052	91
1	75	7.85	33.234	25.93	4.54	0.405	0.176	70
1	100	7.88	33.559	26.18	3.53	0.315	0.265	54
1	125	7.73	33.760	26.44	3.15*	0.281		43
1	150	7.21			2.84	0.254	0.335	

CNAV OSHAWA			CRUISE 051			STATION 068			INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	8.66	0.00	31.872	0.000	24.75	320.8	0.000	0.00	6.54	0.00			
10	8.74	0.00	31.868	0.000	24.73	322.4	0.033	0.02	6.60	0.00			
20	8.70	0.00	31.876	0.000	24.74	321.4	0.065	0.07	6.59	0.00			
30	8.51	0.00	31.929	0.000	24.81	314.9	0.097	0.15	6.55	0.00			
50	8.52	0.00	32.599	0.000	25.34	265.6	0.156	0.38	5.86	0.00			
75	7.85	0.00	33.234	0.000	25.93	209.3	0.216	0.76	4.54	0.00			
100	7.88	0.00	33.559	0.000	26.18	185.9	0.265	1.20	3.53	0.00			
150	7.21	0.00	33.760	0.000	26.44	162.5	0.353	2.31	2.84	0.00			

CNAV OSHAWA CRUISE 051 STATION 069 OBSERVED VALUES

DATE 26/03/63 HR 13-8 LAT 48-14 N LONG 125-09 W SNDG 119 WEA 03 WIND VEL 15 DIR 05
 BARCHM 15- TEMP DRY WET RELHU WTRCLR SEA 2 DIR 05 SWELL 3 DIR 15
 CLOUD TYPE VIS WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
1	0	8.68	31.952	24.81				
1	10	8.64	31.959	24.82				
1	19	8.67	31.961	24.81	6.60	0.589	-0.014	102
1	29	8.70	31.961	24.81	6.55	0.585	-0.010	102
1	48	8.57	32.617	25.34	5.61	0.501	0.073	87
1	72	8.11	33.116	25.80	4.26	0.380	0.198	66
1	97	7.32	33.634	26.32	2.89	0.258	0.329	44
1	106	7.27	33.682	26.37	2.80	0.250	0.338	43

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CNAV OSHAWA CRUISE 051 STATION 069 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.68	0.00	31.952	0.000	24.81	315.2	0.000	0.00			
10	8.64	0.00	31.959	0.000	24.82	314.2	0.032	0.02			
20	8.67	0.00	31.956	0.004	24.81	315.1	0.064	0.07	6.60	0.00	0.88
30	8.70	0.00	31.988	0.009	24.83	313.2	0.096	0.15	6.52	0.01	0.97
50	8.54	0.00	32.666	0.005	25.38	260.9	0.153	0.38	5.50	0.00	0.91
75	8.00	0.02	33.193	0.010	25.88	214.4	0.213	0.76	4.05	0.03	0.87
100	7.28	0.01	33.662	0.003	26.35	170.0	0.262	1.18	2.83	0.01	0.69

CNAV OSHAWA CRUISE 051 STATION 69A BIOLOGICAL DATA

DATE 26/03/63 LAT 48-13 N LONG 125-01 W

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 0.60

MESSENGER TIME 0625

CNAV OSHAWA CRUISE 051 STATION 070 OBSERVED VALUES

POINT OF THE ARCHES

DATE 26/03/63 HR 15.3 LAT 48-14 N LONG 124-52 W SDCG 64 WEA 02 WIND VEL 10 DIR 07
BAROM 16.0 TEMP DRY 9.4 WET 8.9 RELHU 94 WTRCLR SECDI SEA 2 DIR 07 SWELL 3 DIR 16
CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ML/L	AOU	SATN
1	0	8.80	29.421	22.81	6.66	0.595	-0.011	102	
1	5	8.77	30.144	23.38	6.68	0.597	-0.015	103	
1	9	8.73	30.992	24.05	6.65	0.594	-0.015	103	
1	19	8.76	31.354	24.33	6.69	0.598	-0.020	104	
1	28	8.67	31.584	24.52	6.45	0.576	0.001	100	
1	47	8.59	31.794	24.70	6.27	0.560	0.018	97	

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 070		INTERPOLATED AND COMPUTED VALUES				
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.80	0.00	29.421	0.000	22.81	505.3	0.000	0.00	6.66	0.00	1.00
10	8.73	0.00	31.087	0.036	24.12	380.4	0.045	0.02	6.66	0.01	0.85
20	8.75	0.00	31.384	0.000	24.35	358.7	0.082	0.08	6.67	0.01	1.54
30	8.65	0.01	31.623	0.000	24.55	339.6	0.118	0.17	6.39	0.01	

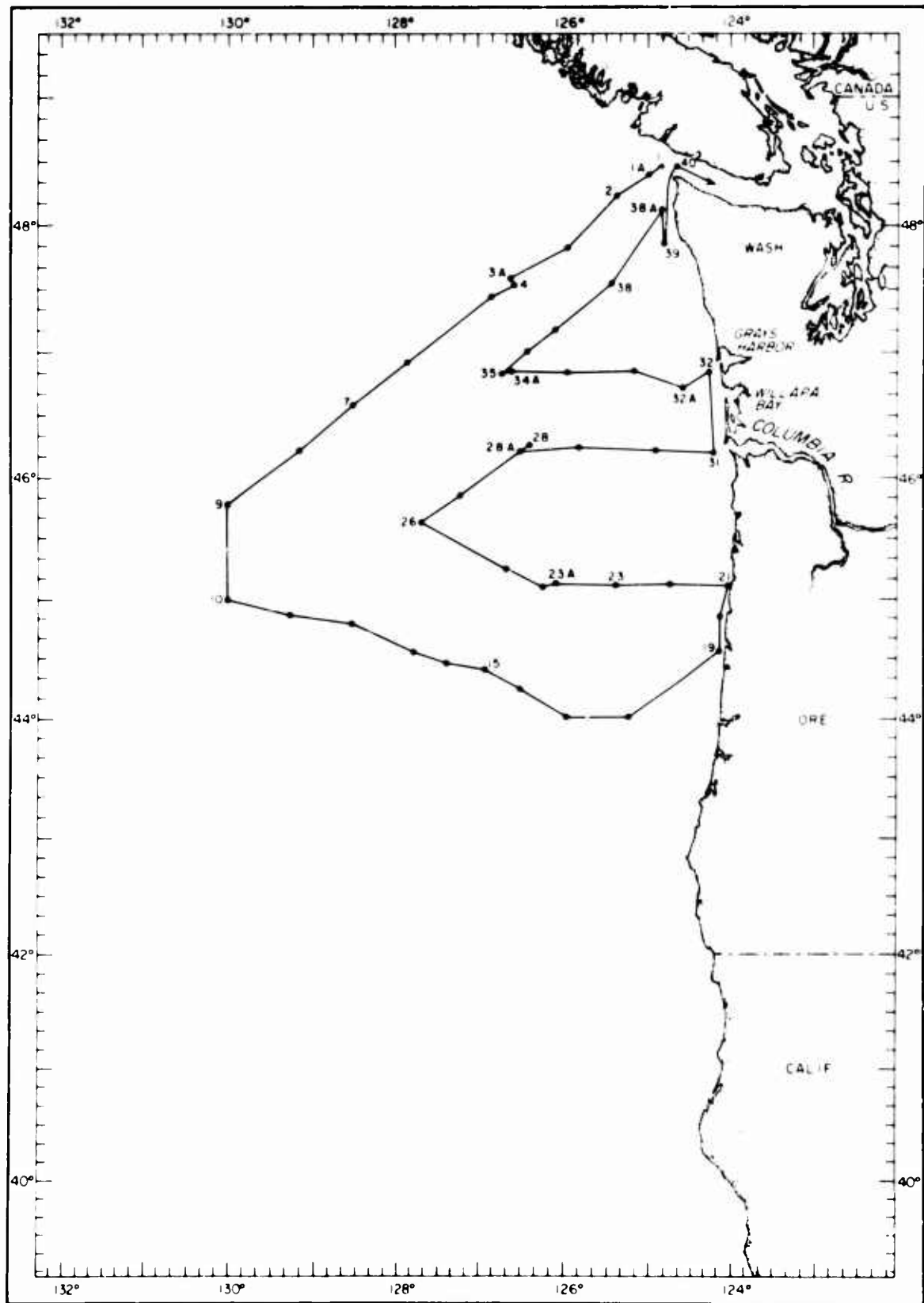


Fig 2. Station locations Brown Bear Cruise 320, 28 March - 10 April 1963

BROWN BEAR				CRUISE 320	STATION 001		OBSERVED VALUES							
				TATOOSH ISLAND										
DATE 29/03/63	HR 12.5	LAT 48-27 N	LONG 124-51 W	SNDG 281	WEA 21	WIND VEL 26	DIR 23							
BAROM 28.0	TEMP DRY 7.9	WET 5.8	RELHU 72	WTRCLR	SEA 2	DIR 23	SWELL 3	DIR 23						
CLOUD TYPE 7	AMT 2	VIS 7	WIRE ANGLE(S) 25											
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN					
1	0	8.57	31.447	24.43	6.20	0.554	0.025		96					
1	4	8.58	31.546	24.50	5.81	0.519	0.060		90					
1	9	8.61	31.631	24.57	5.95	0.531	0.046		92					
1	18	8.68	31.764	24.66	5.78	0.516	0.060		90					
1	26	8.70	31.777	24.67	5.85	0.522	0.054		91					
1	44	8.67	31.876	24.75	5.66	0.506	0.071		88					
1	66	8.58	31.886	24.77	5.52	0.493	0.084		85					
1	88	7.85	32.496	25.35	4.18	0.373	0.211		64					
1	110	7.64	33.041	25.81	3.29	0.294	0.292		50					
1	132	7.37	33.534	26.24	3.16	0.282	0.305		48					
1	153	7.34	33.534	26.24	3.08	0.275	0.312		47					
1	174	7.24	33.658	26.35	2.90	0.259	0.329		44					
1	218	7.15	33.790	26.47	2.90	0.259	0.330		44					

BROWN BEAR CRUISE 320 STATION 001 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.98	1.25		30.590
3	1.23	2.08		30.601
6	1.33	2.03		30.590
12	1.42	2.38		30.587

15.43 24.40 - WATER COLUMN VALUES

MESSENGER TIME 0315 INCOMING SOLAR RADIATION - AM 162 PM 121

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0211-0221 DEPTHS 100, 70
35, 0
0250-0300

DEPTH	BROWN BEAR TEMP	E(T)	CRUISE 320 SAL	E(S)	STATION 001 SIGMA-T	INTERPOLATED AND COMPUTED VALUES						VAR RATIO
						SP VOL ANOMALY	GEO POT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	8.57	0.00	31.447	0.000	24.43	351.2	0.000	0.00	6.20	0.00	0.93	
10	8.62	0.00	31.650	0.002	24.58	336.9	0.035	0.02	5.94	0.01	0.71	
20	8.69	0.00	31.771	0.004	24.66	329.0	0.069	0.07	5.79	0.01	0.94	
30	8.70	0.00	31.798	0.005	24.68	327.3	0.102	0.15	5.83	0.02		
50	8.68	0.02	31.855	0.024	24.73	323.1	0.167	0.42	5.68	0.04	0.75	
75	8.29	0.05	32.103	0.027	24.98	299.5	0.246	0.92	5.02	0.07	0.65	
100	7.71	0.02	32.801	0.001	25.61	239.9	0.314	1.52	3.62	0.01	0.64	
150	7.34	0.01	33.544	0.012	26.25	180.3	0.419	2.84	3.09	0.00	0.82	
200	7.14	0.01	33.719	0.026	26.41	165.3	0.507	4.40	2.78	0.02	12.40	

BROWN BEAR CRUISE 320 STATION 01A BIOLOGICAL DATA

DATE 29/03/63 LAT 48-24 N LONG 124-59 W

DEPTH CHL-A PRODUCTIVITY SAL
LAB-I DECK-I

0 0.51 0.52 2.10 31.840

MESSANGER TIME 0626 INCOMING SOLAR RADIATION - AM 162 PM 121

BROWN BEAR CRUISE 320 STATION 002 OBSERVED VALUES

DATE 30/03/63 HR 00.0 LAT 48-14 N LONG 125-23 W SNGD 113 WEA 02 WIND VEL 30 DIR 23
BAROM 97.0 TEMP DRY 6.9 WET 5.2 RELHU 78 WTRCLR SECDI SEA 3 DIR 23 SWELL 4 DIR 23
CLOUD TYPE 8 AMT 7 VIS 7 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	8.88	32.022	24.83	5.92	0.529	0.044	92	
1	5	8.83	32.022	24.84	5.85	0.522	0.051	91	
1	15	8.84	32.026	24.84	6.31	0.564	0.010	98	
1	24	8.88	32.019	24.83	5.90	0.527	0.046	92	
1	44	8.96	32.753	25.39	5.92	0.529	0.040	93	
1	68	8.66	33.579	26.08	4.89	0.437	0.133	77	
1	92	7.50			2.77	0.247			

DEPTH	CHL-A	PRODUCTIVITY LAB-I	PRODUCTIVITY DECK-I	LIGHT PROD	SAT FILT	SAL	PHOS	NITR	SIL
0	0.55	0.56	4.00			32.111	0.85	5.1	10
7	0.64	0.70	4.66			32.111	0.87	5.1	10
24	0.72	0.85	0.80			32.107	0.87	5.0	10
49	0.75	0.93	0.00	0.21	100	32.107	0.75	3.6	8

100	0.61	0.23	0.03	4
32.142	0.91	5.4	10	

34.05 39.74 86.46 - WATER COLUMN VALUES

MESSANGER TIME 1146 INCOMING SOLAR RADIATION - AM 162 PM 121

LIGHT SATURATION INCUBATOR ILLUMINATION 22200

INTERPOLATED AND COMPUTED VALUES

DEPTH	BROWN BEAR	CRUISE 320	STATION 002		
	TEMP	E(T)	SAL		
		E(S)	SIGMA-T		
0	8.88	0.00	32.022	0.000	24.83
10	8.82	0.00	32.024	0.001	24.84
20	8.86	0.00	32.010	0.009	24.82
30	8.92	0.01	32.187	0.038	24.95
50	8.95	0.01	33.036	0.047	25.61
75	8.43	0.01			

VAR	0.81
RATIO	0.58
	0.91
	1.66

BROWN BEAR CRUISE 320 STATION 003 OBSERVED VALUES
 DATE 30/03/63 HR 07.4 LAT 47-50 N LONG 125-57 W WEA 02 WIND VEL 24 DIR 20
 BAROM 00.7 TEMP DRY 7.2 WET 5.0 RELHU 71 WTRCLR SEA 2 DIR 20 SWELL 1 DIR 18
 CLOUD TYPE 8 AMT 3 VIS 7 WIRE ANGLE(S) 22, 7

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
2	0	8.90	32.165	24.94	6.65	0.594	-0.022	104
2	5	8.87	32.141	24.92	6.73	0.601	-0.029	105
2	10	8.85	32.135	24.92	6.65	0.594	-0.021	104
2	20	8.92	32.178	24.95	6.73	0.601	-0.030	105
2	31	8.96	32.183	24.94	6.73	0.601	-0.030	105
2	51	9.05	32.252	24.98	6.55	0.585	-0.015	103
2	75	8.60	32.611	25.33	5.91	0.528	0.046	92
2	100	8.13	33.163	25.84	4.60	0.411	0.167	71
2	125	7.96	33.396	26.04	4.13	0.369	0.211	64
2	150	7.58	33.597	26.26	3.89	0.347	0.236	60
2	174	7.35	33.753	26.41	3.44	0.307	0.279	52
1	190	7.12	33.875	26.54	2.97	0.265	0.324	45
1	286	5.84	34.018	26.82	1.58	0.141	0.466	23
1	478	4.93	34.131	27.02	0.74	0.066	0.554	11
1	719	4.17	34.273	27.21	0.32	0.029	0.603	5
1	960	3.57	34.391	27.37	0.27	0.024	0.617	4
1	1445	2.64	34.519	27.56	0.73	0.065	0.591	10
1	1542	2.53	34.526	27.57	0.77	0.069	0.589	10

BROWN BEAR CRUISE 320 STATION 003 BIOLOGICAL DATA
 INCOMING SOLAR RADIATION - AM 163 PM 146
 ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0108-0118 DEPTHS 100, 70
 0139-0149 35, 0

BROWN BEAR			CRUISE 320		STATION 003		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0 10 20 30	8.90	0.00	32.165	0.000	24.94	302.5	0.000	0.00	6.65	0.00	0.84	
	8.85	0.00	32.135	0.000	24.92	304.2	0.031	0.02	6.65	0.00		
	8.92	0.00	32.178	0.000	24.95	302.2	0.062	0.06	6.73	0.00		
	8.96	0.00	32.183	0.001	24.94	302.5	0.092	0.14	6.73	0.00		
50 75 100 150	9.05	0.00	32.245	0.001	24.98	299.6	0.153	0.39	6.57	0.00	0.92	
	8.60	0.00	32.611	0.000	25.33	266.2	0.224	0.84	5.91	0.00		
	8.13	0.00	33.163	0.000	25.84	218.9	0.285	1.38	4.60	0.00		
	7.58	0.00	33.597	0.000	26.26	179.7	0.386	2.65	3.89	0.00		
200 250 300 400	6.97	0.01	33.915	0.015	26.59	148.6	0.468	4.12	2.75	0.03	1.41 1.78 0.97 0.75	
	6.28	0.01	34.027	0.037	26.77	131.9	0.539	5.74	1.92	0.07		
	5.73	0.02	34.030	0.003	26.84	125.4	0.604	7.57	1.47	0.02		
	5.15	0.08	34.099	0.009	26.97	114.4	0.725	11.89	0.90	0.09		
500 600 700 800	4.85	0.00	34.144	0.000	27.04	108.5	0.837	17.08	0.68	0.00	0.90 0.67 0.89 0.66	
	4.51	0.01	34.204	0.001	27.12	101.1	0.943	23.05	0.46	0.01		
	4.22	0.00	34.262	0.000	27.20	94.4	1.042	29.64	0.33	0.00		
	3.95	0.00	34.316	0.000	27.27	88.2	1.134	36.75	0.27	0.01		
1000 1200 1500	3.47	0.00	34.407	0.000	27.39	77.5	1.302	52.17	0.30	0.01	1.01 1.80 0.52	
	3.05	0.01	34.473	0.000	27.48	69.2	1.451	68.91	0.48	0.05		
	2.57	0.00	34.524	0.000	27.56	61.7	1.650	96.43	0.76	0.00		

BROWN BEAR CRUISE 320 STATION 03A BIOLOGICAL DATA

DATE 30/03/63 LAT 47-35 N LONG 126-35 W

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 0.20 0.16

MESSANGER TIME 0632 INCOMING SOLAR RADIATION - AM 163 PM 146

BROWN BEAR CRUISE 320 STATION 004 OBSERVED VALUES
 DATE 30/03/63 HR 16.0 LAT 47-32 N LONG 126-34 W WEA 90 WIND VEL 24 DIR 20
 BAROM 01.0 TEMP DRY 7.2 WET 5.8 RELHU 76 WTRCLR SEA 2 DIR 24 SWELL 5 DIR 24
 CLOUD TYPE 3 AMT 6 VIS 7 WIRE ANGLE(S) 20,16
 CST DEPTH TEMP SAL SIGMA-T ML/L MGA/L AOU SATN
 2 0 32.490 6.62 0.591
 2 5 32.504 6.78 0.606
 2 10 32.491 6.63 0.592
 2 20 9.17 32.487 6.62 0.591 -0.024 104
 2 29 32.487 6.64 0.593 -0.026 105
 2 48 32.487 6.61 0.590 -0.023 104
 2 71 32.492 6.61 0.590 -0.023 104
 2 95 8.07 32.895 4.66 0.416 0.164 72
 2 125 7.60 33.333 3.96 0.354 0.231 60
 2 144 7.47 33.640 3.76 0.336 0.249 57
 2 168 7.32 33.796 3.65 0.326 0.262 55
 2 190 7.20 33.849 3.65 0.326 0.262 55
 1 287 7.00 33.934 2.77 0.247 0.343 42
 1 477 4.72 34.049 1.10 0.098 0.526 16
 1 719 3.98 34.253 0.27 0.024 0.611 4
 1 961 3.36 34.359 0.28 0.025 0.620 4
 1 1447 2.59 34.508 0.62 0.055 0.601 8
 1 1739 2.21

STATION 004

BROWN BEAR CRUISE 320

[illegible]

0	0-0.21	0-0.22	32.494
10	0-0.25	0-0.22	32.487
25	0-0.25	0-0.15	32.487
46			32.482

10.80 9.38 - WATER COLUMN VALUES

MESSANGER TIME 0817 INCOMING SOLAR RADIATION - AM 163 PM 146

INTERPOLATED AND COMPUTED VALUES

BROWN BEAR CRUISE 320 STATION 004

VAR
RATIO

QXY
ML/L
(0)3

**POT
ENERGY**

GEOPOT ANOMALY

**SP VOL
ANOMALY**

SIGMA-T

1513

SAL

(113)

TEMP

DEPTH

6.62 0.00

0.000

32.490

00

BROWN BEAR CRUISE 320 STATION 005 OBSERVED VALUES
 DATE 30/03/63 HR 20.0 LAT 47-26 N LONG 126-51 W WEA 03 WIND VEL 16 DIR 26
 BAROM 05.1 TEMP DRY 7.3 WET 4.4 RELHU 65 WTRCLR SEA 2 DIR 26 SWELL 3 DIR 22
 CLOUD TYPE 7 AMT 6 VIS 7 WIRE ANGLE(S) 11

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	9.02	32.420	25.12	6.61	0.590	-0.021	104
1	5		32.413		6.62	0.591		
1	10	8.98	32.421	25.13	6.88	0.614	-0.045	108
1	19	8.98	32.418	25.12	6.96	0.622	-0.052	109
1	29	8.98	32.417	25.12	6.65	0.594	-0.033	104
1	48	8.98	32.416	25.12	6.65	0.594	-0.024	104
1	71	9.01	32.452	25.15	6.59	0.589	-0.019	103
1	96	8.03	32.809	25.57	5.61	0.501	0.080	86
1	120	6.88	33.297	26.12	5.23	0.467	0.128	79
1	145	7.29	33.685	26.36	4.08	0.364	0.228	61
1	170	7.17	33.807	26.48	3.84	0.343	0.246	58
1	193	6.96	33.887	26.57	3.57	0.319	0.272	54
1	282	5.69	33.921	26.76	2.77	0.247	0.362	41

BROWN BEAR CRUISE 320 STATION 005 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	LIGHT SAT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	0.24	0.24	1.87			32.406	0.88	4.8	8
9	0.30	0.20	1.98		50	32.401	0.86	4.6	8
31	0.34	0.16	0.40	0.22 100 0.19 59	10	32.407	0.82	3.6	7

64	0.30	0.17	0.08		1	32.405	0.91	5.0	8
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19.93 11.47 51.28 - WATER COLUMN VALUES

MESSANGER TIME 1130 INCOMING SOLAR RADIATION - AM 163 PM 146

LIGHT SATURATION INCUBATOR ILLUMINATION 22100

BROWN BEAR CRUISE 320 STATION 005 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.02	0.00	32.420	0.000	25.12	285.3	0.000	0.00	6.61	0.00	
10	8.98	0.00	32.421	0.000	25.13	284.8	0.029	0.02	6.88	0.00	
20	8.98	0.00	32.418	0.000	25.12	285.2	0.058	0.06	6.93	0.01	0.88
30	8.98	0.00	32.417	0.000	25.12	285.5	0.087	0.13	6.64	0.01	0.97
50	9.00	0.01	32.413	0.003	25.12	286.4	0.144	0.37	6.66	0.01	0.90
75	8.90	0.02	32.493	0.004	25.20	279.4	0.216	0.83	6.45	0.03	0.81
100	7.79	0.04	32.889	0.006	25.67	234.5	0.280	1.40	5.55	0.03	0.79
150	7.29	0.01	33.721	0.006	26.39	166.5	0.381	2.65	4.00	0.03	0.77
200	6.88	0.00	33.905	0.000	26.59	148.1	0.461	4.07	3.48	0.01	2.15
250	6.18	0.03	33.958	0.001	26.73	135.8	0.532	5.71	2.94	0.05	17.24

BROWN BEAR CRUISE 320 STATION 006 OBSERVED VALUES
 DATE 31/03/63 HR 05.0 LAT 46-56 N LONG 127-51 W WEA 10 WIND VEL 18 DIR 27
 BAROM 11.2 TEMP DRY 7.8 WET 5.0 RELHU 65 WTRCLR SEA 2 DIR 27 SWELL 1 DIR 23
 CLOUD TYPE 4 AMT 7 VIS 7 WIRE ANGLE(S) 25, 7
 CST DEPTH TEMP SAL SIGMA-T ML/L MGA/L OXYGEN AOU SATN
 2 0 9.58 32.551 25.13 6.61 0.590 -0.029 105
 2 5 9.54 32.551 25.14 6.57 0.587 -0.025 104
 2 10 9.53 32.544 25.14 6.60 0.589 -0.027 105
 2 20 9.53 32.546 25.14 6.57 0.587 -0.025 104
 2 30 9.54 32.552 25.14 6.69 0.598 -0.035 106
 2 50 9.58 32.546 25.13 6.53 0.583 -0.022 104
 2 74 9.56 32.555 25.14 6.57 0.587 -0.025 104
 2 99 9.15 32.835 25.42 5.99 0.535 0.031 95
 2 124 7.10 33.175 25.99 5.42 0.484 0.108 82
 2 149 7.38 33.574 26.27 4.40 0.393 0.194 67
 2 174 7.21 33.850 26.51 3.76 0.336 0.252 57
 1 185 7.12 33.867 26.53 3.77 0.337 0.252 57
 1 279 5.94 33.929 26.74 2.82 0.252 0.354 42
 1 468 4.63 34.056 26.99 1.00 0.089 0.536 14
 1 705 3.89 34.237 27.21 0.41 0.037 0.600 6
 1 945 3.54 34.371 27.35 0.35 0.031 0.610 5
 1 1425 2.59 34.509 27.55 0.69 0.062 0.595 9
 1 1716 2.16 32.559 26.03 1.05 0.094 0.580 14

BROWN BEAR CRUISE 320 STATION 006 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	

0	0.18	0.17	32.561
9	0.20	0.06	32.548
31	0.16	0.14	32.543
64	0.21	0.10	32.555

11.83 7.17 - WATER COLUMN VALUES

MESSANGER TIME 2128 INCOMING SOLAR RADIATION - AM 163 PM 146

BROWN BEAR			CRUISE 320			STATION 006		INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0 10 20 30	9.58	0.00	32.551	0.000	25.13	284.1	0.000	0.00	6.61	0.00		
	9.53	0.00	32.544	0.000	25.14	284.0	0.029	0.02	6.60	0.00		
	9.53	0.00	32.546	0.000	25.14	284.0	0.058	0.06	6.57	0.00		
	9.54	0.00	32.552	0.000	25.14	283.9	0.086	0.13	6.69	0.00		
50 75 100 150	9.58	0.00	32.546	0.000	25.13	285.4	0.144	0.37	6.53	0.00		
	9.56	0.01	32.563	0.001	25.14	284.3	0.215	0.83	6.55	0.00	0.94	
	9.06	0.03	32.847	0.000	25.45	256.0	0.283	1.44	5.97	0.00	0.94	
	7.38	0.00	33.586	0.001	26.27	177.8	0.393	2.79	4.37	0.00	0.96	
200 250 300 400	6.94	0.02	33.954	0.052	26.62	145.3	0.474	4.23	3.44	0.12	1.48	
	6.32	0.04	33.996	0.057	26.74	134.8	0.545	5.86	2.95	0.10	1.04	
	5.74	0.01	33.943	0.000	26.77	132.1	0.612	7.76	2.59	0.02	0.95	
	4.98	0.03	34.009	0.000	26.91	119.1	0.739	12.28	1.58	0.04	0.75	
500 600 700 800	4.49	0.01	34.081	0.001	27.03	109.1	0.854	17.58	0.85	0.03	0.85	
	4.13	0.03	34.158	0.003	27.13	100.2	0.960	23.54	0.52	0.06	0.67	
	3.90	0.00	34.233	0.000	27.21	92.9	1.057	30.04	0.41	0.00	0.97	
	3.73	0.02	34.296	0.000	27.28	87.2	1.148	37.05	0.34	0.02	0.63	
1000 1200 1500	3.43	0.01	34.497	0.068	27.47	70.4	1.308	51.64	0.37	0.01	0.95	
	3.04	0.03	34.715	0.166	27.68	51.2	1.431	65.39	0.47	0.01	0.88	
	2.46	0.01	34.231	0.052	27.34	81.9	1.633	94.29	0.78	0.00	0.94	

BROWN BEAR CRUISE 320 STATION 007 OBSERVED VALUES
 DATE 31/03/63 HR 12.1 LAT 46-35 N LONG 128-31 W SNDG 2706 WEA 90 WIND VEL 22 DIR 30
 BAROM 14.0 TEMP DRY 7.5 WET 5.8 RELHU 79 WTRCLR SEA 2 DIR 30 SWELL 3 DIR 30
 CLOUD TYPE 3 AMT 6 VIS 5 WIRE ANGLE(S) 32.15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
2	0	9.60	32.548	25.13	6.38	0.570	-0.009	102
2	5	9.58	32.552	25.13	6.41	0.573	-0.011	102
2	9	9.54	32.553	25.14	6.41	0.573	-0.010	102
2	18	9.56	32.566	25.15	6.37	0.569	-0.007	101
2	27	9.58	32.555	25.14	6.38	0.570	-0.008	101
2	44	9.59	32.550	25.13	6.38	0.570	-0.008	101
2	66	9.59	32.548	25.13	6.38	0.570	-0.008	101
2	87	9.09	32.636	25.28	6.12	0.547	0.021	96
2	109	7.64	33.007	25.78	5.41	0.483	0.102	83
2	131	6.66	33.192	26.06				
2	152	6.88	33.473	26.25	4.96	0.443	0.151	75
1	170	7.01	33.712	26.43	4.46	0.398	0.193	67
1	257	5.90	33.922	26.74	3.16	0.282	0.324	47
1	430	4.99	34.028	26.93	1.18	0.105	0.515	17
1	649	4.12	34.206	27.16	0.38	0.034	0.599	5
1	871	3.54	34.327	27.32	0.27	0.024	0.618	4
1	1315	2.70	34.501	27.54	0.60	0.054	0.601	8
1	1584	2.26	34.542	27.61	0.91	0.081	0.581	12

BIOLOGICAL DATA

STATION 007

CRUISE 320

BROWN BEAR

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.24	0.28	1.64	32.554
9	0.22	0.29		32.555
31	0.24	0.17		32.556
64	0.20	0.26		32.555
100	0.22	0.20		32.556

14.30 15.05 - WATER COLUMN VALUES

MESSENGER TIME 0554 INCOMING SOLAR RADIATION - AM 195 PM 211

DEPTH	BROWN BEAR		CRUISE 320		STATION 007		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	9.60	0.00	32.548	0.000	25.13	284.6	0.000	0.00	6.38	0.00	0.97	
10	9.54	0.00	32.555	0.001	25.14	283.3	0.029	0.02	6.41	0.00	0.75	
20	9.56	0.00	32.564	0.001	25.15	283.2	0.058	0.06	6.37	0.00	0.91	
30	9.58	0.00	32.553	0.000	25.13	284.5	0.086	0.13	6.38	0.00		
50	9.62	0.02	32.544	0.003	25.12	286.0	0.144	0.37	6.35	0.01	0.76	
75	9.46	0.02	32.564	0.007	25.16	282.6	0.215	0.83	6.31	0.01	0.64	
100	8.26	0.06	32.849	0.019	25.57	244.1	0.282	1.42	5.71	0.03	0.66	
150	6.84	0.02	33.444	0.001	26.24	181.1	0.389	2.75	4.98	0.02	0.99	
200	6.77	0.12	33.879	0.055	26.59	148.5	0.472	4.22	3.90	0.06	1.65	
250	6.03	0.04	33.936	0.018	26.73	135.6	0.543	5.87	3.23	0.02	0.91	
300	5.58	0.05	33.966	0.014	26.81	128.4	0.610	7.75	2.57	0.01	0.89	
400	5.08	0.04	34.023	0.011	26.91	119.2	0.735	12.22	1.45	0.01	0.79	
500	4.68	0.00	34.085	0.004	27.01	110.9	0.851	17.57	0.78	0.04	0.73	
600	4.29	0.00	34.167	0.003	27.12	101.4	0.958	23.61	0.45	0.04	0.75	
700	3.97	0.01	34.237	0.001	27.21	93.4	1.057	30.17	0.32	0.02	0.74	
800	3.70	0.01	34.293	0.001	27.28	87.1	1.148	37.19	0.26	0.02	0.62	
1000	3.27	0.01	34.389	0.001	27.39	76.5	1.313	52.41	0.32	0.02	0.91	
1200	2.89	0.01	34.467	0.001	27.49	67.8	1.460	68.88	0.47	0.02	0.88	
1500	2.40	0.01	34.536	0.001	27.59	58.8	1.652	95.48	0.82	0.01	0.66	

BROWN BEAR CRUISE 320 STATION 008 OBSERVED VALUES

DATE 31/03/63 HR 20.4 LAT 46-13 N LONG 129-10 W WEA 01 WIND VEL 22 DIR 32
 BAROM 17.3 TEMP DRY 8.1 WET 5.8 RELHU 70 WTRCLR SEA 3 DIR 23 SWELL 4 DIR 27
 CLOUD TYPE 6 AMT 5 VIS 6 WIRE ANGLE(S) 31.10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
2	0	9.39	32.526	25.14	6.40	0.572	-0.008		101
2	5	9.37	32.526	25.15	6.45	0.576	-0.012		102
2	10	9.36	32.524	25.15	6.46	0.577	-0.013		102
2	20	9.35	32.526	25.15	6.48	0.579	-0.014		103
2	29	9.37	32.526	25.15	6.42	0.573	-0.009		102
2	49	9.35	32.523	25.15	6.38	0.570	-0.005		101
2	73	9.35	32.531	25.15	6.40	0.572	-0.007		101
2	97	9.32	32.528	25.16	6.37	0.569	-0.004		101
2	121	7.27	32.962	25.80	5.73	0.512	0.079		87
2	145	6.63	33.277	26.13	5.38	0.481	0.118		80
2	172	6.85	33.676	26.42	4.61	0.412	0.182		69
1	230	6.20	33.918	26.69	3.42	0.305	0.297		51
1	395	4.91	33.997	26.91	1.50	0.134	0.487		22
1	606	4.24	34.187	27.14	0.46	0.041	0.590		7
1	819	3.74	34.304	27.28	0.26	0.023	0.615		4
1	1246	2.74	34.474	27.51	0.43	0.038	0.616		6
1	1510	2.36							

BROWN BEAR CRUISE 320 STATION 009 OBSERVED VALUES
 DATE 1/04/63 HR 05.4 LAT 45-47 N LONG 130-00 W SNJG 1829 WEA 61 WIND VEL 20 DIR 32
 BAROM 19.6 TEMP DRY 8.1 WET 5.4 RELHU 68 WTRCLR SEA 2 DIR 32 SWELL 3 DIR 31
 CLOUD TYPE 0 AMT 6 VIS 6 WIRE ANGLE(S) 23.15
 CST DEPTH TEMP SAL SIGMA-T ML/L MGA/L OXYGEN - - - - - SATN
 2 0 9.37 32.532 25.15 6.48 0.579 -0.014 103
 2 5 9.36 32.528 25.15 6.78 0.606 -0.041 107
 2 10 9.32 32.524 25.15 6.52 0.582 -0.017 103
 2 20 9.34 32.530 25.15 6.62 0.591 -0.027 105
 2 30 9.35 32.533 25.16 6.68 0.597 -0.032 106
 2 50 9.34 32.531 25.16 6.48 0.579 -0.014 102
 2 74 9.36 32.533 25.15 6.53 0.583 -0.019 103
 2 99 8.81 32.640 25.32 6.23 0.556 0.015 97
 2 124 7.07 33.112 25.95 5.56 0.497 0.096 84
 2 149 6.63 33.433 26.26 5.24 0.468 0.130 78
 2 174 6.98 33.796 26.50 4.07 0.364 0.228 61
 2 186 6.94 33.835 26.53 3.84 0.343 0.249 58
 1 280 5.81 33.913 26.74 3.07 0.274 0.334 45
 1 468 4.51 34.036 26.99 1.16 0.104 0.524 17
 1 704 3.89 34.252 27.22 0.37 0.033 0.603 5
 1 940 3.36 34.370 27.37 0.24 0.021 0.623 3
 1 1413 2.64 34.511 27.55 0.60 0.054 0.602 8
 1 1703 2.12 34.570 27.64 1.13 0.101 0.564 15

BROWN BEAR CRUISE 320 STATION 009 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-1	SAL
0	0.19	0.04	32.535
9	0.18	0.19	32.532
31	0.18	0.12	32.531
64	0.21	0.07	32.527
100	0.18	0.15	32.527

12.07 7.39 - WATER COLUMN VALUES

MESSANGER TIME 2202 INCOMING SOLAR RADIATION - AM 195 PM 211
 ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0025-0035 DEPTHS 100, 70
 35, 0

DEPTH	BROWN BEAR		CRUISE 320		STATION 009		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	9.37	0.00	32.532	0.000	25.15	282.3	0.000	0.00	6.48	0.00	0.94 0.94 0.94	
10	9.32	0.00	32.524	0.000	25.15	282.3	0.029	0.02	6.52	0.00		
20	9.34	0.00	32.530	0.000	25.15	282.3	0.057	0.06	6.62	0.00		
30	9.35	0.00	32.533	0.000	25.16	282.4	0.086	0.13	6.68	0.00	0.94 0.94 0.94	
50	9.34	0.00	32.531	0.000	25.16	282.8	0.143	0.37	6.48	0.00		
75	9.36	0.00	32.533	0.002	25.15	283.3	0.214	0.82	6.53	0.00		
100	8.74	0.02	32.657	0.003	25.35	265.3	0.283	1.44	6.20	0.00	1.97 2.26 0.95	
150	6.64	0.01	33.451	0.003	26.27	178.0	0.395	2.82	5.19	0.01		
200	6.81	0.04	33.860	0.008	26.57	150.5	0.478	4.29	3.67	0.04		
250	6.23	0.06	33.911	0.014	26.68	139.9	0.551	5.98	3.22	0.07	0.85 0.67 0.97	
300	5.62	0.01	33.926	0.001	26.77	131.8	0.619	7.91	2.85	0.03		
400	4.87	0.02	33.992	0.003	26.91	119.0	0.746	12.43	1.81	0.06		
500	4.39	0.02	34.066	0.003	27.03	109.0	0.861	17.72	0.98	0.02	0.62 0.94 0.88	
600	4.09	0.04	34.159	0.007	27.13	99.7	0.966	23.66	0.57	0.05		
700	3.90	0.00	34.248	0.000	27.22	91.7	1.063	30.10	0.37	0.00		
800	3.66	0.00	34.308	0.003	27.29	85.4	1.153	37.00	0.26	0.02	0.94 0.88 9.64	
1000	3.26	0.01	34.393	0.001	27.40	76.1	1.316	52.04	0.25	0.00		
1200	2.95	0.03	34.459	0.003	27.48	69.0	1.463	68.62	0.35	0.01		
1500	2.50	0.00	34.529	0.001	27.58	60.5	1.660	95.81	0.74	0.00		

BROWN BEAR CRUISE 320 STATION 010 OBSERVED VALUES
 DATE 1/04/63 HR 14.5 LAT 45-00 N LONG 130-00 W WEA 02 WIND VEL 8 DIR 36
 BAROM 21.0 TEMP DRY 9.6 WET 6.1 RELHU 60 WTRCLR SECDI 2468 SEA 1 DIR 36 SWELL 2 DIR 36
 CLOUD TYPE 3 AMT 6 VIS 7 WIRE ANGLE(S) 10, 8, 7

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
3	0	9.93	32.597	25.11	6.42	0.573	-0.016		103
3	5	9.90	32.594	25.11	6.41	0.573	-0.015		103
3	10	9.87	32.593	25.12	6.40	0.572	-0.014		102
3	20	9.88	32.587	25.11	6.41	0.573	-0.015		103
3	30	9.89	32.591	25.11	6.37	0.569	-0.011		102
3	50	9.87	32.587	25.11	6.40	0.572	-0.014		102
3	73	9.85	32.592	25.12	6.41	0.573	-0.015		103
3	98	9.93	32.599	25.11	6.37	0.569	-0.012		102
3	123	7.18	33.022	25.86	5.73	0.512	0.080		86
3	148	6.76	33.360	26.18	5.23	0.467	0.129		78
3	173	7.06	33.747	26.45	4.40	0.393	0.198		67
2	196	7.06	33.864	26.54	3.96	0.354	0.236		60
2	294	5.66	33.919	26.76	2.91	0.260	0.350		43
2	492	4.50	34.090	27.03	0.79	0.071	0.557		11
2	737	3.86	34.284	27.25	0.24	0.021	0.615		3
2	984	3.37	34.404	27.40	0.28	0.025	0.619		4
2	1479	2.47	34.525	27.57	0.77	0.069	0.590		10
2	1776	2.10	34.573	27.64	1.16	0.104	0.561		16
1	1780	2.07	34.567	27.64	1.28	0.114	0.551		17
1	2077	1.87	34.614	27.69	1.71	0.153	0.516		23
1	2428	1.81	34.643	27.72	2.06	0.184	0.486		27

BROWN BEAR			CRUISE 320			STATION 010			BIOLOGICAL DATA				
DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	PROD	LIGHT SAT	IRRAD	SAL	PHOS	NITR	SIL			
0	0.16	0.30	1.18	0.33	100	50	32.591	0.57	0.9	2			
8	0.16	0.22	1.72	0.32	59		32.586	0.60	1.5	3			
				0.29	44								
				0.22	32								
				0.10	13								
				0.00	4								
26	0.19	0.26	0.10			10	32.586	0.64	1.5	3			
60	0.21	0.20	0.06			1	32.589	0.72	1.9	3			
100	0.06	0.00					32.826	0.98	6.9	9			
150	0.00						33.352	1.63	26.3	28			
200	0.00						33.884	1.96	27.5	39			

11.07 14.30 30.78 - WATER COLUMN VALUES

MESSENGER TIME 1123 INCOMING SOLAR RADIATION - AM 200 PM 211

LIGHT SATURATION INCUBATOR ILLUMINATION 20600

BROWN BEAR		CRUISE 320		STATION 010		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0 10 20 30	9.93	0.00	32.597	0.000	25.11	286.1	0.000	0.00	6.42	0.00	
	9.87	0.00	32.593	0.000	25.12	285.7	0.029	0.02	6.40	0.00	
	9.88	0.00	32.587	0.000	25.11	286.4	0.058	0.06	6.41	0.00	
	9.89	0.00	32.591	0.000	25.11	286.5	0.087	0.13	6.37	0.00	
50 75 100 150	9.87	0.00	32.587	0.000	25.11	286.9	0.145	0.37	6.40	0.00	
	9.91	0.04	32.585	0.005	25.11	288.1	0.217	0.84	6.42	0.01	0.90
	9.72	0.06	32.627	0.006	25.17	282.5	0.289	1.48	6.33	0.01	0.89
	6.78	0.01	33.395	0.004	26.21	184.0	0.407	2.93	5.16	0.01	0.89
200 250 300 400	7.02	0.02	33.873	0.005	26.55	152.3	0.491	4.43	3.90	0.01	1.08
	6.40	0.12	33.938	0.030	26.68	140.0	0.565	6.13	3.30	0.06	1.32
	5.60	0.01	33.924	0.000	26.77	131.8	0.634	8.06	2.83	0.01	0.99
	4.86	0.07	34.006	0.004	26.93	118.0	0.760	12.55	1.68	0.06	0.77
500 600 700 800	4.47	0.00	34.097	0.000	27.04	107.7	0.873	17.80	0.75	0.01	0.96
	4.15	0.03	34.181	0.002	27.14	98.7	0.978	23.67	0.37	0.07	0.68
	3.92	0.02	34.258	0.001	27.23	91.3	1.074	30.07	0.23	0.04	0.81
	3.73	0.00	34.320	0.001	27.30	85.3	1.163	36.94	0.22	0.01	0.72
1000 1200 1500 2000	3.34	0.00	34.410	0.001	27.40	75.8	1.326	51.94	0.29	0.00	0.98
	2.95	0.01	34.470	0.004	27.49	68.3	1.472	68.40	0.45	0.01	0.89
	2.44	0.00	34.528	0.000	27.58	59.8	1.667	95.30	0.80	0.00	0.88
	1.72	0.12	34.556	0.032	27.66	51.5	1.950	145.82	2.41	0.53	3.97

BROWN BEAR CRUISE 320 STATION 10A BIOLOGICAL DATA

DATE 1/04/63 LAT 45-00 N LONG 130-00 W

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 0.22 0.42 2.68

MESSANGER TIME 0550 INCOMING SOLAR RADIATION - AM 200 PM 211

BROWN BEAR CRUISE 320 STATION 011 OBSERVED VALUES
 DATE 2/04/63 HR 00.0 LAT 44-53 N LONG 129-16 W WEA 02 WIND VEL 4 DIR 20
 BAROM 20.0 TEMP DRY 9.0 WET 6.1 RELHU 65 WTRCLR SEA 1 DIR 20 SWELL 1 DIR 20
 CLOUD TYPE 3 AMT 6 VIS 9 WIRE ANGLE(S) 0.2
 CST DEPTH TEMP SAL SIGMA-T ML/L MGA/L OXYGEN AU SATN
 2 0 10.33 32.640 25.08 6.50 0.581 -0.029 105
 2 5 10.32 32.613 25.06 6.46 0.577 -0.025 105
 2 10 9.96 32.593 25.10 6.50 0.581 -0.024 104
 2 20 9.94 32.597 25.11 6.42 0.573 -0.017 103
 2 30 9.89 32.583 25.11 6.50 0.581 -0.023 104
 2 50 9.68 32.552 25.12 6.48 0.579 -0.019 103
 2 74 9.68 32.554 25.12 6.46 0.577 -0.017 103
 2 99 8.95 32.929 25.53 5.63 0.503 0.065 89
 2 124 8.00 33.089 25.80 5.36 0.479 0.101 83
 2 149 6.92 33.358 26.16 5.19 0.464 0.131 78
 2 174 7.42 33.788 26.43 4.16 0.372 0.220 63
 1 190 7.00 33.819 26.51 2.92 0.261 0.350 43
 1 294 5.64 33.923 26.77 0.97 0.087 0.540 14
 1 492 4.54 34.068 27.01 0.27 0.024 0.612 4
 1 740 3.92 34.270 27.24 0.29 0.026 0.618 4
 1 990 3.38 34.411 27.40 0.76 0.068 0.591 10
 1 1484 2.45 34.529 27.58 1.22 0.109 0.557 16
 1 1785 2.05 34.575 27.65

BROWN BEAR			CRUISE 320	STATION 011	BIOLOGICAL DATA
DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL	
0	0.17	0.34		32.626	
8	0.24	0.24		32.603	
26	0.31	0.44		32.590	
60	0.31	0.35		32.546	
100	0.06	0.01		32.931	
17.19		21.82	- WATER COLUMN VALUES		
MESSENGER TIME 1637		INCOMING SOLAR RADIATION - AM 200 PM 211			

DEPTH	BROWN BEAR		CRUISE 320		STATION 011		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	10.33	0.00	32.640	0.000	25.08	289.3	0.000	0.00	6.50	0.00		
10	9.96	0.00	32.593	0.000	25.10	287.1	0.030	0.02	6.50	0.00		
20	9.94	0.00	32.597	0.000	25.11	286.6	0.058	0.06	6.42	0.00		
30	9.89	0.00	32.583	0.000	25.11	287.1	0.087	0.13	6.50	0.00		
50	9.68	0.00	32.552	0.000	25.12	286.5	0.145	0.37	6.48	0.00		
75	9.66	0.00	32.567	0.004	25.13	285.5	0.217	0.83	6.43	0.01	0.94	
100	8.92	0.00	32.936	0.002	25.54	247.2	0.284	1.43	5.61	0.00	0.94	
150	6.94	0.02	33.378	0.004	26.17	187.3	0.394	2.80	5.17	0.00	0.98	
200	6.81	0.03	33.333	0.002	26.55	152.5	0.479	4.31	3.99	0.03	1.44	
250	6.04	0.07	33.890	0.006	26.69	139.0	0.553	6.00	3.32	0.07	2.14	
300	5.59	0.01	33.928	0.000	26.78	131.3	0.621	7.92	2.85	0.00	0.98	
400	4.90	0.06	34.004	0.003	26.92	118.5	0.747	12.42	1.77	0.03	0.75	
500	4.51	0.00	34.075	0.000	27.02	109.8	0.862	17.73	0.93	0.01	0.96	
600	4.21	0.03	34.158	0.003	27.12	101.1	0.969	23.74	0.50	0.05	0.68	
700	3.99	0.02	34.239	0.002	27.20	93.5	1.067	30.29	0.29	0.03	0.80	
800	3.78	0.00	34.309	0.000	27.28	86.8	1.158	37.30	0.23	0.02	0.73	
1000	3.36	0.00	34.415	0.001	27.41	75.7	1.323	52.41	0.29	0.00	0.99	
1200	2.95	0.01	34.477	0.007	27.49	67.8	1.468	68.78	0.43	0.01	0.89	
1500	2.42	0.00	34.531	0.000	27.58	59.5	1.661	95.51	0.78	0.00	1.00	

BROWN BEAR CRUISE 320 STATION 012 OBSERVED VALUES
 DATE 2/04/63 HR 05.8 LAT 44-48 N LONG 128-32 W SEA 03 WIND VEL 10 DIR 14
 BAROM 18.3 TEMP DRY 11.0 WET 5.4 RELHU 40 WTRCLR SNDCG 2287 SEA 1 DIR 14 SWELL 2 DIR 11
 CLOUD TYPE 2 AMT 7 VIS 6 WIRE ANGLE(S) 13,10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
2	0	10.70	32.737	25.09	6.27	0.560	-0.013	102
2	5	10.68	32.709	25.07	6.37	0.569	-0.022	104
2	10	10.66	32.707	25.07	6.34	0.566	-0.019	103
2	20	10.55	32.707	25.09	6.33	0.565	-0.017	103
2	30	10.55	32.710	25.09	6.29	0.562	-0.013	102
2	50	10.55	32.702	25.09	6.25	0.558	-0.009	102
2	74	10.56	32.703	25.09	6.23	0.556	-0.008	101
2	99	9.49	32.864	25.39	5.68	0.507	0.054	90
2	124	8.46	33.092	25.73	5.25	0.469	0.105	82
2	149	8.14	33.442	26.05	4.12	0.368	0.209	64
2	174	7.71	33.786	26.38	3.57	0.319	0.262	55
1	195	7.66	33.890	26.47	2.99	0.267	0.315	46
1	293	5.96	33.929	26.73	2.88	0.257	0.348	42
1	490	4.55	34.074	27.01	0.96	0.086	0.541	14
1	736	3.96	34.255	27.22	0.34	0.030	0.605	5
1	983	3.42	34.389	27.38	0.36	0.032	0.611	5
1	1476	2.47	34.530	27.58	0.76	0.068	0.591	10
1	1774	2.06			1.32	0.118		

BROWN BEAR CRUISE 320 STATION 012 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.24	0.36		32.702
8	0.25	0.12		32.698
26	0.42	0.29		32.658
60	0.39	0.25		32.694
100	0.05	0.00		32.953

21.87 14.86 - WATER COLUMN VALUES

MESSSENGER TIME 2119 INCOMING SOLAR RADIATION - AM 200 PM 211
 ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 2259-2309 DEPTHS 100, 70
 35, 0

BROWN BEAR			CRUISE 320			STATION 012			INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	10.70	0.00	32.737	0.000	25.09	288.2	0.000	0.00	6.27	0.00			
10	10.66	0.00	32.707	0.000	25.07	289.9	0.030	0.02	6.34	0.00			
20	10.55	0.00	32.707	0.000	25.09	288.3	0.059	0.06	6.33	0.00			
30	10.55	0.00	32.710	0.000	25.09	288.3	0.088	0.13	6.29	0.00			
50	10.55	0.00	32.702	0.000	25.09	289.3	0.146	0.37	6.25	0.00			
75	10.53	0.01	32.707	0.001	25.10	289.0	0.219	0.84	6.21	0.00	0.94		
100	9.44	0.00	32.871	0.000	25.40	260.0	0.288	1.44	5.67	0.01	0.94		
150	8.12	0.00	33.458	0.001	26.07	197.6	0.403	2.90	4.09	0.00	0.94		
200	7.59	0.02	33.901	0.006	26.49	158.1	0.493	4.48	2.94	0.04	1.12		
250	6.81	0.13	33.956	0.031	26.64	144.1	0.569	6.24	2.70	0.20	1.44		
300	5.88	0.01	33.933	0.001	26.75	134.4	0.639	8.22	2.82	0.02	0.98		
400	4.98	0.08	34.002	0.004	26.91	119.5	0.767	12.79	1.90	0.15	0.77		
500	4.51	0.01	34.082	0.000	27.02	109.3	0.883	18.10	0.91	0.01	0.95		
600	4.20	0.05	34.158	0.002	27.12	101.0	0.989	24.09	0.52	0.06	0.68		
700	4.00	0.03	34.230	0.001	27.20	94.3	1.088	30.66	0.35	0.03	0.82		
800	3.82	0.00	34.294	0.000	27.27	88.2	1.180	37.77	0.31	0.02	0.72		
1000	3.38	0.00	34.397	0.000	27.39	77.2	1.347	53.16	0.36	0.00	5.85		
1200	2.97	0.01	34.471	0.000	27.49	68.4	1.495	69.78	0.47	0.01	12.71		
1500	2.43	0.00							0.80	0.00	12.36		

BROWN BEAR CRUISE 320 STATION 013 OBSERVED VALUES
 DATE 2/04/63 HR 12.7 LAT 44-34 N LONG 127-48 W SNGD 2834 WEA 03 WIND VEL 18 DIR 12
 BAROM 18.0 TEMP DRY 9.7 WET 7.2 RELHU 67 WTRCLR SEA 1 DIR 12 SWELL 3 DIR 15
 CLOUD TYPE 3 AMT 8 VIS 6 WIRE ANGLE(S) 32.20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN ML/L	AOU	SATN
2	0	9.99	32.592	25.10	6.48	0.579	-0.023	104
2	5	9.96	32.590	25.10	6.46	0.577	-0.020	104
2	10	9.91	32.587	25.11	6.52	0.582	-0.025	105
2	20	9.94	32.591	25.10	6.47	0.578	-0.021	104
2	30	9.96	32.590	25.10	6.47	0.578	-0.021	104
2	50	9.93	32.589	25.10	6.42	0.573	-0.016	103
2	74	9.93	32.589	25.10	6.44	0.575	-0.018	103
2	99	9.14	32.741	25.35	6.00	0.536	0.031	95
2	124	8.08	33.362	26.00	4.70	0.420	0.158	73
2	149	7.81	33.689	26.29	4.02	0.359	0.221	62
1	171	7.61	33.868	26.46	3.42	0.305	0.277	52
2	174	7.54	33.878	26.48	3.36	0.300	0.283	51
1	258	6.30	33.955	26.71	2.72	0.243	0.358	40
1	435	4.86	34.017	26.93	1.36	0.121	0.501	20
1	658	4.04	34.184	27.16	0.50	0.045	0.590	7
1	883	3.66	34.328	27.31	0.39	0.035	0.605	5
1	1334	2.78	34.494	27.52	0.54	0.048	0.605	7
1	1609	2.20			0.97	0.087		

BROWN BEAR CRUISE 320 STATION 013 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	SAL
0	0.24	0.39	32.601
8	0.26	0.34	32.591
26	0.24	0.27	32.590
60	0.26	0.22	32.587

15.16 16.74 - WATER COLUMN VALUES

MESSANGER TIME 0604 INCOMING SOLAR RADIATION - AM 55 PM 47

BROWN BEAR			CRUISE 320			STATION 013		INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	9.99	0.00	32.592	0.000	25.10	287.4	0.000	0.00	6.48	0.00		
10	9.91	0.00	32.587	0.000	25.11	286.7	0.029	0.02	6.52	0.00		
20	9.94	0.00	32.591	0.000	25.10	287.1	0.058	0.06	6.47	0.00		
30	9.96	0.00	32.590	0.000	25.10	287.7	0.087	0.13	6.47	0.00		
50	9.93	0.00	32.589	0.000	25.10	287.6	0.145	0.37	6.42	0.00		
75	9.91	0.00	32.589	0.002	25.11	287.7	0.218	0.84	6.44	0.00	0.94	
100	9.09	0.01	32.764	0.005	25.38	262.6	0.287	1.46	5.95	0.01	0.94	
150	7.80	0.00	33.699	0.000	26.30	175.2	0.397	2.82	3.99	0.00	0.95	
200	7.19	0.05	33.956	0.034	26.59	148.5	0.479	4.27	3.03	0.09	1.38	
250	6.43	0.02	33.969	0.013	26.70	138.1	0.551	5.93	2.73	0.04	0.88	
300	5.85	0.03	33.973	0.006	26.78	131.2	0.619	7.84	2.37	0.02	0.91	
400	5.05	0.02	34.008	0.005	26.90	120.0	0.746	12.37	1.61	0.02	0.78	
500	4.54	0.02	34.062	0.004	27.01	111.1	0.862	17.75	1.02	0.01	0.74	
600	4.18	0.02	34.137	0.004	27.10	102.3	0.970	23.82	0.64	0.01	0.73	
700	3.95	0.01	34.213	0.000	27.19	94.9	1.070	30.46	0.45	0.02	0.78	
800	3.78	0.02	34.279	0.001	27.26	88.9	1.163	37.61	0.38	0.02	0.60	
1000	3.44	0.00	34.389	0.001	27.38	78.5	1.332	53.19	0.37	0.01	11.24	
1200	3.05	0.00	34.466	0.001	27.48	69.7	1.482	70.10	0.43	0.01	9.61	
1500	2.43	0.00							0.76	0.00	6.44	

BROWN BEAR CRUISE 320 STATION 014 BIOLOGICAL DATA

DATE 2/04/63 LAT 44-28 N LONG 127-24 W

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	SAL	PHOS	NITR	SIL
0	0.32	0.76	3.12	0.39 0.54 0.49 0.48	100 59 44 32	32.561	0.68	2.3	4
8	0.27	0.38	2.06	0.17	13				
26	0.28	0.43	0.24	0.02	4				
						32.557	0.68	1.9	3
						32.558			
60	0.38	0.21	0.00			32.560	0.45	2.0	3

	18.60	22.82	45.50	-	WATER COLUMN VALUES
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MESSENGER TIME 1120 INCOMING SOLAR RADIATION - AM 55 PM 47

LIGHT SATURATION INCUBATOR ILLUMINATION 19500

DATE 3/04/63 HR 14-8 LAT 44-25 N LONG 126-52 W WEA 02 WIND VEL 20 DIR 22
 BAROM 15.0 TEMP DRY 10.6 WET 9.7 RELHU 88 WTRCLR SEA 1 DIR 22 SWELL 6 DIR 15
 CLOUD TYPE 3 AMT 8 VIS 7 WIFE ANGLE(S) 20,14,14

BROWN BEAR				CRUISE 320	STATION 015	OBSERVED VALUES			
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
2	0	9.73	32.569	25.12	6.46	0.577	-0.017	103	
2	5	9.74	32.564	25.12	6.44	0.575	-0.016	103	
2	10	9.68	32.568	25.13	6.47	0.578	-0.018	103	
2	20	9.70	32.570	25.13	6.46	0.577	-0.017	103	
3	30	9.66	32.571	25.14	6.47	0.578	-0.017	103	
3	50	9.66	32.565	25.13	6.47	0.578	-0.017	103	
3	74	9.68	32.568	25.13	6.50	0.581	-0.020	104	
3	99	8.84	33.144	25.71	4.70	0.420	0.149	74	
3	124	8.68	33.659	26.14	3.45	0.308	0.261	54	
3	149	7.80	33.745	26.34	3.56	0.318	0.262	55	
3	174	7.31	33.847	26.49	3.45	0.308	0.278	53	
1	188	7.14	33.901	26.56	3.29	0.294	0.295	50	
1	279	6.19	33.973	26.74	2.28	0.204	0.398	34	
1	474	4.78	34.069	26.98	1.05	0.094	0.529	15	
1	714	4.16	34.267	27.21	0.39	0.035	0.597	6	
1	955	3.50	34.399	27.38	0.37	0.033	0.609	5	
1	1437	2.61	34.518	27.56	0.71	0.063	0.593	10	
1	1733	2.11	34.558	27.63	1.15	0.103	0.562	15	

BROWN BEAR CRUISE 320 STATION 015 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.35	0.45		32.562
8	0.43	0.53		32.562
26	0.45	0.36		32.561
60	0.46	0.23		32.561

26.37 22.00 - WATER COLUMN VALUES

MESSANGER TIME 0740 INCOMING SOLAR RADIATION - AM 136 PM 106

BROWN BEAR			CRUISE 320			STATION 015		INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	9.73	0.00	32.569	0.000	25.12	285.1	0.000	0.00	6.46	0.00		
10	9.68	0.00	32.568	0.000	25.13	284.5	0.029	0.02	6.47	0.00		
20	9.70	0.00	32.570	0.000	25.13	284.9	0.058	0.06	6.46	0.00		
30	9.66	0.00	32.571	0.000	25.14	284.4	0.087	0.13	6.47	0.00		
50	9.66	0.00	32.565	0.000	25.13	285.2	0.144	0.37	6.47	0.00		
75	9.65	0.01	32.586	0.004	25.15	283.9	0.216	0.83	6.44	0.02	0.94	
100	8.83	0.01	33.169	0.002	25.73	228.7	0.280	1.40	4.63	0.01	0.94	
150	7.77	0.00	33.749	0.000	26.35	171.2	0.381	2.66	3.56	0.00	0.94	
200	7.00	0.00	33.925	0.009	26.59	148.2	0.461	4.09	3.15	0.00	1.61	
250	6.47	0.00	33.977	0.017	26.71	138.0	0.534	5.75	2.58	0.01	1.76	
300	6.00	0.00	33.984	0.002	26.77	132.2	0.602	7.67	2.10	0.01	0.97	
400	5.22	0.00	34.034	0.005	26.91	120.1	0.729	12.22	1.41	0.03	0.77	
500	4.68	0.02	34.090	0.002	27.01	110.7	0.845	17.58	0.94	0.00	0.88	
600	4.38	0.05	34.172	0.006	27.11	102.1	0.953	23.64	0.60	0.01	0.67	
700	4.18	0.01	34.255	0.001	27.20	94.5	1.052	30.25	0.41	0.00	0.92	
800	3.92	0.01	34.321	0.001	27.28	87.5	1.144	37.33	0.34	0.02	0.65	
1000	3.40	0.01	34.416	0.002	27.40	76.1	1.310	52.54	0.38	0.00	0.95	
1200	3.01	0.02	34.476	0.005	27.49	68.5	1.456	60.05	0.48	0.00	0.88	
1500	2.51	0.01	34.526	0.001	27.57	60.8	1.653	96.22	0.79	0.00	0.97	

BROWN BEAR CRUISE 320 STATION 016 OBSERVED VALUES
 DATE 3/04/63 HR 19.8 LAT 44-15 N LONG 126-31 W WEA 03 WIND VEL 18 DIR 23
 BAROM 20.7 TEMP DRY 11.4 WET 9.9 RELHU 84 WTRCLR SECDI 2926 SEA 2 DIR 23 SWELL 8 DIR 23
 CLOUD TYPE 7 AMT 8 VIS 5 WIRE ANGLE(S) 5
 CST DEPTH TEMP SAL SIGMA-T ML/L MGA/L OXYGEN AOU SATN
 1 0 9.94 32.558 25.08 6.46 0.577 -0.020 104
 1 5 9.99 32.561 25.07 6.50 0.581 -0.024 104
 1 10 9.89 32.557 25.09 6.55 0.585 -0.027 105
 1 20 9.90 32.557 25.08 6.51 0.581 -0.024 104
 1 30 9.90 32.555 25.08 7.38 0.659 -0.102 118
 1 50 9.92 32.558 25.08 6.46 0.577 -0.020 104
 1 73 9.90 32.559 25.09 6.44 0.575 -0.018 103
 1 98 8.09 33.191 25.86 4.86 0.434 0.145 75
 1 123 7.61 33.564 26.22 4.47 0.399 0.184 68
 1 148 7.65 33.823 26.42 3.40 0.304 0.278 52
 1 172 7.49 33.899 26.50 3.16 0.282 0.302 48

BROWN BEAR CRUISE 320 STATION 016 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	CRUISE 320 DECK-I	STATION 016 LIGHT SAT PROD	STATION 016 IRRAD	BIOLOGICAL DATA SAL	PHOS	NITR	SIL
0		0.49	2.66			32.570	0.68	1.7	4
6	0.37	0.47	3.34		50	32.565	0.61	1.8	5
24	0.38	0.37	0.14		10	32.579	0.61	0.8	3
60	0.32	0.30	0.00	0.38	100	32.567	0.64	1.4	3
				0.41	59				
				0.36	44				
				0.27	32				
				0.18	13				
				0.03	4				

21.57 22.52 44.28 - WATER COLUMN VALUES

MESSANGER TIME 1127 INCOMING SOLAR RADIATION - AM 136 PM 106

LIGHT SATURATION INCUBATOR ILLUMINATION 19700

INTERPOLATED AND COMPUTED VALUES									
BROWN BEAR	TEMP	E(T)	CRUISE 320 SAL	E(S)	STATION 016 SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	VAR RATIO
0	9.94	0.00	32.558	0.000	25.08	289.2	0.000	0.00	0.00
10	9.89	0.00	32.557	0.000	25.09	288.6	0.030	0.02	0.00
20	9.90	0.00	32.557	0.000	25.08	289.0	0.059	0.06	0.00
30	9.90	0.00	32.555	0.000	25.08	289.3	0.088	0.14	0.00
50	9.92	0.00	32.558	0.000	25.08	289.8	0.146	0.37	0.00
75	9.77	0.04	32.602	0.011	25.14	284.5	0.218	0.84	0.03
100	8.02	0.01	33.228	0.002	25.90	212.5	0.281	1.39	0.02
150	7.65	0.01	33.837	0.001	26.43	162.9	0.376	2.57	0.01

BROWN BEAR CRUISE 320 STATION 017 OBSERVED VALUES									
DATE 4/04/63		HR 00-2	LAT 44-01 N	LONG 125-59 W	WEA 00	WIND VEL 18 DIR 22	SEA 2 DIR 22	SWELL 4 DIR 16	
BAROM 24.0		TEMP DRY 10.3	WET 10.1	RELHU 97	WTRCLR	SECDI			
CLOUD TYPE 3		AMT 8	VIS 5	WIRE ANGLE(S) 33.00					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	AOU	SATN	
2	0	10.07	32.598	25.09	6.57	0.587	-0.032	106	
2	5	10.04	32.602	25.10	6.60	0.589	-0.034	106	
2	10	10.02	32.595	25.09	6.57	0.587	-0.031	106	
2	20	10.02	32.599	25.10	6.57	0.587	-0.031	106	
2	30	10.07	32.631	25.11	6.53	0.583	-0.028	105	
2	50	10.09	32.632	25.11	6.46	0.577	-0.022	104	
2	74	9.71	33.320	25.71	6.50	0.581	-0.024	104	
2	99	9.00	33.706	26.13	4.93	0.440	0.124	78	
2	124	8.57	33.834	26.29	2.88	0.257	0.312	45	
2	149	8.31	33.896	26.38	2.65	0.237	0.336	41	
1	169	8.13	33.923	26.43	2.54	0.227	0.348	39	
2	174	8.08	33.943	26.45	2.46	0.220	0.356	38	
1	259	6.96	34.019	26.67	1.88	0.168	0.423	28	
1	435	5.53	34.074	26.90	1.09	0.097	0.514	16	
1	663	4.56	34.249	27.15	0.34	0.030	0.595	5	
1	895	3.95	34.318	27.27	0.31	0.028	0.607	4	
1	1363	2.76	34.515	27.54	0.69	0.062	0.592	9	
1	1650	2.24	34.550	27.61	1.01	0.090	0.572	14	

DEPTH	BROWN BEAR		CRUISE 320		STATION 017		INTERPOLATED AND COMPUTED VALUES						VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)			
0	10.07	0.00	32.598	0.000	25.09	288.3	0.000	0.00	6.57	0.00	0.94 0.94 0.94 1.57 0.89 0.91 0.78 0.75 0.72 0.81 0.59 0.92 0.87 0.81		
10	10.02	0.00	32.595	0.000	25.09	287.9	0.030	0.02	6.57	0.00			
20	10.02	0.00	32.599	0.000	25.10	287.8	0.059	0.06	6.57	0.00			
30	10.07	0.00	32.631	0.000	25.11	286.4	0.087	0.13	6.53	0.00			
50	10.09	0.00	32.632	0.000	25.11	287.0	0.145	0.37	6.46	0.00			
75	9.68	0.00	33.341	0.001	25.73	228.5	0.210	0.78	6.46	0.01			
100	8.98	0.00	33.714	0.001	26.14	190.5	0.263	1.25	4.84	0.01			
150	8.30	0.00	33.898	0.000	26.38	167.7	0.353	2.39	2.64	0.00			
200	7.75	0.03	33.965	0.003	26.52	155.6	0.435	3.85	2.31	0.02			
250	7.08	0.01	34.012	0.000	26.65	143.6	0.510	5.58	1.95	0.01			
300	6.55	0.02	34.035	0.006	26.74	135.5	0.580	7.57	1.66	0.01			
400	5.74	0.02	34.066	0.006	26.87	124.1	0.711	12.25	1.22	0.01			
500	5.18	0.02	34.123	0.008	26.98	114.1	0.832	17.79	0.82	0.01			
600	4.76	0.02	34.200	0.007	27.09	104.4	0.942	24.00	0.50	0.01			
700	4.45	0.01	34.263	0.003	27.17	97.0	1.044	30.79	0.31	0.01			
800	4.18	0.01	34.295	0.005	27.23	92.3	1.140	38.16	0.27	0.02			
1000	3.66	0.01	34.366	0.007	27.34	82.7	1.317	54.47	0.36	0.01			
1200	3.15	0.01	34.452	0.009	27.46	71.9	1.473	72.10	0.51	0.02			
1500	2.48	0.01	34.547	0.005	27.59	58.9	1.672	99.48	0.85	0.01			

BROWN BEAR CRUISE 320 STATION 018 OBSERVED VALUES									
DATE	4/04/63	HR	06.1	LAT	44-01 N	LONG	125-16 W	WEA	02
BAROM	36.2	TEMP	DRY 11.2	WET 10.4	REL HU	92	WTR CLR	SEA	2
CLOUD	TYPE 3	AMT 7	VIS 7	WIRE	ANGLE(S) 25.12, 6			DIR	22
								SWELL	4
								DIR	17
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN AOU	SECDI	WIND VEL
2	0	10.18	32.731*	25.17	6.53	0.583	-0.030	105	
2	5	10.16	32.642	25.11	6.52	0.582	-0.028	105	
2	10	10.12	32.652	25.12	6.53	0.583	-0.029	105	
2	20	10.10	32.647	25.12	6.51	0.581	-0.027	105	
2	30	10.12	32.643	25.12	6.50	0.581	-0.026	105	
2	50	10.09	32.644	25.12	6.40	0.572	-0.017	103	
2	74	9.97	33.176	25.56	5.38	0.481	0.074	87	
2	99	9.47	33.436	25.84	4.45	0.397	0.162	71	
2	124	8.97	33.666	26.10	3.57	0.319	0.246	56	
2	149	8.38	33.830	26.32	2.84	0.254	0.318	44	
2	174	8.15	33.913	26.42	2.53	0.226	0.349	39	
3	198	7.86	33.961	26.50	2.42	0.216	0.362	37	
3	297	6.71	34.030	26.72	1.80	0.161	0.434	27	
3	494	5.17	34.131	26.99	0.76	0.068	0.549	11	
3	741	4.31	34.309	27.23	0.27	0.024	0.605	4	
3	988	3.70	34.404	27.36	0.35	0.031	0.607	5	
3	1484	2.71	34.522	27.55	0.82	0.073	0.581	11	
3	1781	2.19	34.564	27.63	1.19	0.106	0.557	16	
1	1815	2.21	34.572	27.63	1.21	0.108	0.555	16	
1	1963	2.05	34.601	27.67	1.38	0.123	0.542	19	
1	2356	1.77	34.630	27.71	1.92	0.171	0.499	26	
1	2750	1.69	34.628	27.72	2.07	0.185	0.487	28	

BROWN BEAR CRUISE 320 STATION 018 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	1.22	1.43		32.630
2	1.33	0.96		32.630
9	1.35	1.16		32.630
24	1.51	0.85		32.631

33.36 24.81 - WATER COLUMN VALUES

MESSANGER TIME 2107 INCOMING SOLAR RADIATION - AM 136 PM 106

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0050-0100 DEPTHS 100, 70
35, 0

BROWN BEAR			CRUISE 320		STATION 018		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	10.18	0.00	32.731	0.000	25.17	280.2	0.000	0.00	6.53	0.00		
10	10.12	0.00	32.652	0.000	25.12	285.2	0.029	0.02	6.53	0.00		
20	10.10	0.00	32.647	0.000	25.12	285.5	0.058	0.06	6.51	0.00		
30	10.12	0.00	32.643	0.000	25.12	286.3	0.087	0.13	6.50	0.00		
50	10.09	0.00	32.644	0.000	25.12	286.1	0.144	0.37	6.40	0.00		
75	9.95	0.00	33.190	0.002	25.57	244.1	0.211	0.79	5.34	0.00	0.94	
100	9.45	0.00	33.446	0.000	25.85	217.6	0.269	1.31	4.41	0.00	0.94	
150	8.37	0.00	33.834	0.000	26.32	173.4	0.368	2.55	2.82	0.00	0.94	
200	7.84	0.00	33.963	0.001	26.51	156.9	0.451	4.03	2.41	0.00	1.04	
250	7.24	0.01	34.011	0.008	26.63	145.8	0.527	5.79	2.11	0.01	1.31	
300	6.68	0.00	34.032	0.000	26.72	137.5	0.599	7.80	1.78	0.00	0.99	
400	5.80	0.01	34.084	0.004	26.88	123.5	0.730	12.50	1.20	0.01	0.77	
500	5.14	0.00	34.135	0.001	27.00	112.7	0.849	17.99	0.74	0.00	0.97	
600	4.71	0.04	34.209	0.006	27.10	103.2	0.959	24.13	0.46	0.01	0.68	
700	4.40	0.02	34.280	0.003	27.19	95.2	1.059	30.81	0.30	0.01	0.80	
800	4.15	0.01	34.337	0.002	27.27	89.0	1.152	37.98	0.26	0.01	0.73	
1000	3.67	0.00	34.408	0.000	27.37	79.8	1.323	53.70	0.36	0.00	0.99	
1200	3.25	0.01	34.464	0.002	27.46	72.2	1.477	71.06	0.51	0.01	0.90	
1500	2.68	0.00	34.524	0.000	27.55	63.0	1.682	99.43	0.84	0.00	0.91	
2000	2.01	0.00	34.606	0.001	27.68	51.4	1.973	151.13	1.44	0.01	1.01	
2500	1.72	0.00	34.630	0.002	27.72	47.8	2.225	209.60	2.05	0.02	1.60	

BROWN BEAR CRUISE 320 STATION 18A BIOLOGICAL DATA

DATE 4/04/63 LAT 44-20 N LONG 124-36 W

DEPTH CHL-A LAB-I PRODUCTIVITY DECK-I SAL

0 1.05 2.44 15.04 32.594

MESSENGER TIME 0602 INCOMING SOLAR RADIATION - AM 101 PM 135

BROWN BEAR CRUISE 320 STATION 019 OBSERVED VALUES

YAQUINA BAY ENTRANCE

DATE 4/04/63 HR 17.2 LAT 44-34 N LONG 124-08 W SNG 40 WEA 45 WIND VEL 6 DIR 18
 BAROM 26.1 TEMP DRY 11.7 WET 11.2 RELHU 94 WTRCLR SECDI SEA 1 DIR 18 SWELL 2 DIR 25
 CLOUD TYPE 7 AMT 9 VIS 2 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.11	28.576	21.96	6.71	0.599	-0.029	105	
1	5	10.02	30.353	23.35	6.64	0.593	-0.029	105	
1	10	10.00	30.866	23.75	6.62	0.591	-0.028	105	
1	14	10.00	31.436	24.20	6.55	0.585	-0.024	104	
1	19	10.04	31.741	24.43	6.48	0.579	-0.020	104	
1	24	10.00	31.756	24.44	6.50	0.581	-0.021	104	

BROWN BEAR CRUISE 320 STATION 019 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	3.07	13.94		28.386
2	3.32	14.06		29.435
6	2.93	13.91		30.377
10	2.59	11.79		30.771
25	1.99	8.53		31.756
29.93	135.43	-	WATER COLUMN VALUES	

MESSANGER TIME 0920 INCOMING SOLAR RADIATION - AM 101 PM 135

BROWN BEAR			CRUISE 320			STATION 019			INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	10.11	0.00	28.576	0.000	21.96	587.3	0.000	0.00	6.71	0.00	1.19			
10	10.00	0.00	30.866	0.000	23.75	415.7	0.051	0.02	6.62	0.00				
20	10.04	0.00	31.762	0.004	24.44	350.2	0.090	0.08	6.47	0.00				

BROWN BEAR										OBSERVED VALUES																							
DATE 4/04/63		HR 20.3		LAT 44-52 N		LONG 124-07 W		STATION 020		SEA 0 DIR 18		WIND VEL 6 DIR 18		CLOUD TYPE 7		AMT 8		VIS 5		WIRE ANGLE(S) 20		SNDG 62		WTRCLR		RELHU 92		WIRCLR		SEA 0 DIR 18		SWELL 1 DIR 28	
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN																								
1	0	10.39	29.335	22.50	7.00	0.625	-0.061		111																								
1	5	10.03	31.066	23.90	6.78	0.606	-0.044		108																								
1	9	9.98	31.726	24.42	6.57	0.587	-0.027		105																								
1	14	9.96	32.256	24.84	6.46	0.577	-0.019		103																								
1	19	9.97	32.300	24.87	6.27	0.560	-0.002		100																								
1	23	9.92	32.319	24.90	6.42	0.573	-0.015		103																								
1	33	9.90	32.334	24.91	6.35	0.567	-0.009		102																								
1	42	9.91	32.347	24.92	6.38	0.570	-0.012		102																								
1	52	9.88	32.352	24.93	6.33	0.565	-0.007		101																								

BROWN BEAR CRUISE 320 STATION 020 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	2.51	6.66				50	29.459	0.61	4.7	24
2	3.04	13.87		18.56	100	10	30.289	0.62	4.2	19
7	2.94	11.11		13.84	59		31.201	0.71	3.5	14
				9.70	44					
				8.70	32					
				3.25	13					
				0.77	4					
12	2.59	8.05				1	31.816	0.64	1.3	8
52	0.77	1.59					32.340	0.68	2.7	6

34.52 130.88 - WATER COLUMN VALUES

MESSANGER TIME 1232 INCOMING SOLAR RADIATION - AM 101 PM 135

LIGHT SATURATION INCUBATOR ILLUMINATION 18500

INTERPOLATED AND COMPUTED VALUES											
DEPTH	BROWN BEAR	CRUISE 320	STATION 020								
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEO POT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.39	0.00	29.335	0.000	22.50	535.2	0.000	0.00	7.00	0.00	
10	9.97	0.00	31.865	0.004	24.53	341.2	0.045	0.02	6.54	0.01	0.80
20	9.96	0.00	32.306	0.000	24.88	308.5	0.077	0.07	6.30	0.01	0.70
30	9.90	0.00	32.332	0.002	24.91	305.8	0.108	0.15	6.40	0.03	0.85
50	9.89	0.00	32.352	0.000	24.93	304.6	0.170	0.40	6.36	0.01	0.80

BROWN BEAR	CRUISE 320	STATION 021	OBSERVED VALUES
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CASCADE HEAD

DATE 4/04/63 HR 22.3 LAT 45-07 N LONG 124-02 W
BAROM 23.0 TEMP DRY 11.8 WET 11.3 RELHU 96 WTRCLR
CLOUD TYPE 7 AMT 9 VIS 2 WIRE ANGLE(S) 10
SNOG 38 WEA 45 WIND VEL 8 DIR 20
SECDI SEA 0 DIR 20 SWELL 1 DIR 18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.30	30.008	23.04	6.85	0.612	-0.050		109
1	5	10.07	30.462	23.43	6.73	0.601	-0.038		107
1	10	10.00	30.790	23.69	6.59	0.589	-0.026		105
1	15	9.95	31.538	24.28	6.50	0.581	-0.020		104
1	20	9.96	31.770	24.46	6.43	0.574	-0.015		103
1	30	9.91	32.082	24.71	6.23	0.556	0.003		100

DEPTH	BROWN BEAR		CRUISE 320		STATION 021		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP	VCL	GEOPOT	POT	OXY	E(O)	VAR
						ANOMALY		ANOMALY	ENERGY	ML/L		RATIO
0	10.30	0.00	30.008	0.000	23.04	483.9		0.000	0.00	6.85	0.00	
10	10.00	0.00	30.790	0.000	23.69	421.3		0.046	0.02	6.59	0.00	
20	9.96	0.00	31.770	0.000	24.46	348.2		0.085	0.08	6.43	0.00	
30	9.91	0.00	32.082	0.000	24.71	324.5		0.119	0.17	6.23	0.00	

	BROWN BEAR	CRUISE 320	STATION 022	OBSERVED VALUES	
DATE	5/04/63	HR 03.0	LAT 45-07 N	LONG 124-44 W	
BAROM	19.3	TEMP DRY 10.4	WEI 9.9	REL HU 93	WTR CLR
CLOUD TYPE / AMT	9 VIS 1	WIRE ANGLE(S) 0			
		SNDG 366	SEA 2 DIR 18	SWELL 1 DIR 13	
		SEC DI	WIND VEL 4 DIR 18		

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.93	32.045	24.68	6.69	0.598	-0.038		107
1	5	9.94	32.042	24.68	6.69	0.598	-0.039		107
1	10	9.85	32.038	24.69	6.66	0.595	-0.035		106
1	20	9.75	32.051	24.72	6.56	0.586	-0.025		104
1	30	9.80	32.117	24.76	6.54	0.584	-0.024		104
1	50	9.83	32.222	24.84	6.50	0.581	-0.021		104
1	75	9.80	33.023	25.46	5.25	0.469	0.088		84
1	100	9.11	33.438	25.90	4.13	0.369	0.195		65
1	125	8.41	33.632	26.16	3.45	0.308	0.264		54
1	150	8.11	33.751*	26.30	3.12	0.279	0.295		48
1	181	7.74	33.877*	26.45	2.77	0.247	0.333		43
1	203	7.38	34.019*	26.61	2.48	0.221	0.363		38
1	253	6.18	33.934*	26.71	1.79	0.160	0.442		27

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL	BROWN BEAR	CRUISE 320	STATION 022	BIOLOGICAL DATA	
0	1.39	1.80		32.043					
2	1.37	1.85		32.043					
7	1.58	2.06		32.040					
12	1.49	2.17		32.047					
	17.81	24.01	-	WATER COLUMN VALUES					
MESSENGER TIME 1918					INCOMING SOLAR RADIATION - AM 101 PM 135				

DEPTH	BROWN BEAR		CRUISE 320		STATION 022		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	9.93	0.00	32.045	0.000	24.68	327.0	0.000	0.00	6.69	0.00		
10	9.85	0.00	32.038	0.000	24.69	326.5	0.033	0.02	6.66	0.00		
20	9.75	0.00	32.051	0.000	24.72	324.1	0.066	0.07	6.56	0.00		
30	9.80	0.00	32.117	0.000	24.76	320.2	0.099	0.15	6.54	0.00		
50	9.83	0.00	32.222	0.000	24.84	313.2	0.162	0.41	6.50	0.00		
75	9.80	0.00	33.023	0.000	25.46	253.9	0.234	0.86	5.25	0.00		
100	9.11	0.00	33.438	0.000	25.90	212.9	0.293	1.38	4.13	0.00		
150	8.11	0.00							3.12	0.00		
200	7.43	0.00							2.52	0.00	0.77	
250	6.27	0.00							1.83	0.00	10.77	

BROWN BEAR CRUISE 320 STATION 023 OBSERVED VALUES
 DATE 5/04/63 HR 07.9 LAT 45-07 N LONG 125-24 W WEA 62 WIND VEL 10 DIR 14
 BAROM 13.9 TEMP DRY 11.7 WET 10.0 RELHU 83 WTRCLR SECDI 1920 SEA 1 DIR 14 SWELL 2 DIR 11
 CLOUD TYPE 7 AMT 9 VIS 2 WIRE ANGLE(S) 16, 3

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
2	0	10.15	32.424*	24.94	6.54	0.584	-0.029	105
2	5	10.11	32.420*	24.94	6.70	0.598	-0.043	108
2	10	10.00	32.461	24.99	6.65	0.594	-0.037	107
2	20	9.98	32.465	25.00	6.85	0.612	-0.055	110
2	30	9.94	32.467	25.01	6.27	0.560	-0.003	100
2	50	9.91	32.592	25.11	6.34	0.566	-0.009	102
2	74	9.66	33.187	25.62	5.05	0.451	0.107	81
2	99	9.20	33.440	25.89	4.20	0.375	0.188	67
2	124	8.74	33.624	26.10	3.37	0.301	0.267	53
2	149	8.32	33.710	26.23	3.00	0.268	0.305	47
2	174	8.15	33.854	26.37	2.50	0.223	0.352	39
1	188	8.10	33.893	26.41	2.62	0.234	0.342	41
1	281	6.21	33.994	26.75	2.07	0.185	0.417	31
1	471	5.18	34.102	26.96	0.95	0.085	0.532	14
1	707	4.30	34.269	27.20	0.36	0.032	0.598	5
1	943	3.65	34.399	27.37	0.43	0.038	0.601	6
1	1421	2.81	34.511	27.53	0.85	0.076	0.577	12
1	1706	2.26	34.563	27.62	1.18	0.105	0.557	16

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BROWN BEAR CRUISE 320 STATION 023 BIOLOGICAL DATA
 INCOMING SOLAR RADIATION - AM 134 PM 156
 ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0123-0133 DEPTHS 100, 70
 30, 0

DEPTH	BROWN BEAR		CRUISE 320		STATION 023		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEO POT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	10.15	0.00							6.54	0.00		
10	10.00	0.00	32.461	0.000	24.99	297.5			6.65	0.00		
20	9.98	0.00	32.465	0.000	25.00	297.1			6.85	0.00		
30	9.94	0.00	32.467	0.000	25.01	296.5			6.27	0.00		
50	9.91	0.00	32.592	0.000	25.11	287.1			6.34	0.00	0.94	
75	9.64	0.00	33.201	0.002	25.63	238.2			5.01	0.00	0.94	
100	9.18	0.00	33.449	0.000	25.90	213.3			4.16	0.00	0.94	
150	8.31	0.00	33.716	0.001	26.24	181.3			2.97	0.01		
200	7.91	0.07	33.915	0.005	26.46	161.6			1.1	0.04	1.62	
250	6.94	0.13	33.977	0.009	26.68	144.2			2.38	0.09	1.87	
300	6.02	0.05	34.007	0.002	26.79	130.7			1.94	0.01	0.96	
400	5.33	0.14	34.068	0.006	26.92	118.8			1.33	0.02	0.75	
500	5.05	0.00	34.123	0.001	27.00	112.6			0.84	0.00	0.86	
600	4.66	0.01	34.193	0.003	27.10	103.7			0.53	0.01	0.67	
700	4.32	0.00	34.264	0.000	27.19	95.4			0.37	0.00	0.96	
800	4.02	0.00	34.325	0.000	27.27	88.3			0.34	0.02	0.63	
1000	3.54	0.01	34.418	0.003	27.39	77.4			0.47	0.00	0.95	
1200	3.17	0.03	34.474	0.007	27.47	70.5			0.62	0.01	0.89	
1500	2.68	0.00	34.523	0.001	27.56	63.0			0.94	0.00	0.99	

BROWN BEAR CRUISE 320 STATION 024 OBSERVED VALUES

DATE 5/04/63 HR 15.2 LAT 45-06 N LONG 126-15 W SNOG 2779 WEA 45 WIND VEL 4 DIR 12
 BAROM 03.7 TEMP DRY 11.8 WET 11.1 RELHU 93 WTRCLR SEA 1 DIR 13 SWELL 0 DIR 12
 CLOUD TYPE 7 AMT 9 VIS 2 WIRE ANGLE(S) 0.7

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
2	0	10.02	32.545	25.06	7.02	0.627	-0.071	113
2	5	10.00	32.560	25.07	6.80	0.607	-0.051	109
2	10	10.00	32.606	25.11	6.71	0.599	-0.043	108
2	20	9.99	32.636	25.13	6.64	0.593	-0.037	107
2	30	10.02	32.638	25.13	6.54	0.584	-0.028	105
2	50	9.99	32.649	25.14	6.43	0.574	-0.018	103
2	74	9.63	33.011	25.48	5.43	0.485	0.074	87
2	99	9.13	33.406	25.87	4.39	0.392	0.172	70
2	124	8.74						
2	149	8.37	33.644	26.18	3.04	0.272	0.301	47
2	174	7.93	33.790	26.36	2.97	0.265	0.313	46
1	198	7.60	33.884	26.48	2.63	0.235	0.348	40
1	297	6.38	34.012	26.75	2.04	0.182	0.417	30
1	496	5.04	34.138	27.01	0.78	0.070	0.549	11
1	743	4.19	34.296	27.23	0.38	0.034	0.597	15
1	990	3.48	34.420	27.40	0.46	0.041	0.601	6
1	1486	2.58	34.529	27.57	0.90	0.080	0.576	12
1	1784	2.12	34.574	27.64	1.37	0.122	0.542	18

BROWN BEAR CRUISE 320 STATION 024 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.90	0.91		32.556
6	0.99	1.58		32.557
16	1.35	1.45		32.625
31	1.06	0.97		32.624
100	0.05	0.01		33.420

35.45 40.85 - WATER COLUMN VALUES

MESSANGER TIME 0750 INCOMING SOLAR RADIATION - AM 134 PM 156

DEPTH	BROWN BEAR		CRUISE 320		STATION 024		INTERPOLATED AND COMPUTED VALUES						VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)			
0	10.02	0.00	32.545	0.000	25.06	291.4	0.000	0.00	7.02	0.00	0.95 0.99 0.94 1.04 1.31 0.99 0.78 0.98 0.68 0.79 0.74		
10	10.00	0.00	32.606	0.000	25.11	286.7	0.030	0.02	6.71	0.00			
20	9.99	0.00	32.636	0.000	25.13	284.6	0.058	0.06	6.64	0.00			
30	10.02	0.00	32.638	0.000	25.13	285.1	0.087	0.13	6.54	0.00			
50	9.99	0.00	32.649	0.000	25.14	284.2	0.144	0.37	6.43	0.00	0.95 0.99 0.94 1.04 1.31 0.99 0.78 0.98 0.68 0.79 0.74		
75	9.61	0.00	33.028	0.001	25.50	250.6	0.212	0.80	5.39	0.00			
100	9.11	0.00	33.414	0.003	25.88	214.8	0.270	1.32	4.35	0.00			
150	8.35	0.00	33.650	0.000	26.18	186.8	0.372	2.60	3.04	0.00			
200	7.57	0.00	33.889	0.001	26.49	158.7	0.459	4.14	2.61	0.00	0.95 0.99 0.94 1.04 1.31 0.99 0.78 0.98 0.68 0.79 0.74		
250	6.92	0.01	33.980	0.016	26.65	143.8	0.535	5.90	2.24	0.06			
300	6.35	0.00	34.015	0.000	26.75	134.4	0.605	7.88	2.02	0.00			
400	5.56	0.04	34.088	0.007	26.91	120.2	0.734	12.46	1.34	0.04			
500	5.02	0.00	34.141	0.000	27.01	110.9	0.850	17.83	0.77	0.00	0.95 0.99 0.94 1.04 1.31 0.99 0.78 0.98 0.68 0.79 0.74		
600	4.62	0.03	34.206	0.001	27.11	102.2	0.958	23.90	0.50	0.03			
700	4.30	0.02	34.270	0.001	27.20	94.8	1.057	30.53	0.39	0.02			
800	4.01	0.00	34.328	0.000	27.27	88.0	1.150	37.64	0.37	0.01			
1000	3.46	0.00	34.423	0.000	27.40	76.1	1.316	52.90	0.46	0.00	0.95 0.99 0.94 1.04 1.31 0.99 0.78 0.98 0.68 0.79 0.74		
1200	3.05	0.02	34.480	0.006	27.49	68.6	1.462	69.43	0.60	0.00			
1500	2.56	0.00	34.531	0.000	27.57	61.0	1.660	96.69	0.92	0.00			

BROWN BEAR CRUISE 320 STATION 025 OBSERVED VALUES
 DATE 5/04/63 HR 19.9 LAT 45-15 N LONG 126-41 W WEA 02 WIND VEL 12 DIR 25
 BAROM 03.7 TEMP DRY 11.2 WET 10.7 RELHU 95 WTRCLR SECDI 2761 SEA 1 DIR 25 SWELL 1 DIR 25
 CLOUD TYPE 7 AMT 8 VIS 3 WIRE ANGLE(S) --
 CST DEPTH TEMP SAL SIGMA-T ML/L MGA/L OXYGEN AOU SATN
 1 0 10.25 32.635 25.09 6.62 0.591 -0.038 107
 1 5 10.19 32.631 25.09 6.62 0.591 -0.038 107
 1 10 10.11 32.633 25.11 6.65 0.594 -0.039 107
 1 20 10.11 32.633 25.11 6.62 0.591 -0.037 107
 1 30 10.09 32.644 25.12 6.56 0.586 -0.031 106
 1 50 10.00 32.655 25.14 6.45 0.576 -0.020 104
 1 74 9.90 33.316 25.68 4.92 0.439 0.115 79
 1 99 9.33 33.552 25.95 3.99 0.356 0.204 64
 1 124 8.75 33.772 26.22 3.55 0.317 0.250 56
 1 149 8.39 33.888 26.36 2.69 0.240 0.331 42
 1 174 7.97 33.942 26.47 2.55 0.228 0.349 39

BROWN BEAR CRUISE 320 STATION 025 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	CRUISE 320	STATION 025	LIGHT SAT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	1.17	2.61	17.00		2.38	100	50	32.631	0.66	2.4	4
6	1.27	2.41	12.14		2.22	77		32.629	0.39	3.8	4
					1.57	59					
					1.19	32					
					1.01	21					
					0.07	4					
20		1.90	1.86				10	32.634	0.67	2.4	4
42	1.12	1.10	0.04				1	32.645	0.69	2.3	5
100	0.10							33.522	1.68	23.1	25
200	0.00							33.963	2.19	34.0	42

50.34 78.24 206.30 - WATER COLUMN VALUES

MESSENGER TIME 1136 INCOMING SOLAR RADIATION - AM 134 PM 156

LIGHT SATURATION INCUBATOR ILLUMINATION 18800

BROWN BEAR CRUISE 320 STATION 025				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.25	0.00	32.635	0.000	25.09	288.4	0.000	0.00	6.62	0.00	
10	10.11	0.00	32.633	0.000	25.11	286.5	0.029	0.02	6.65	0.00	
20	10.11	0.00	32.633	0.000	25.11	286.7	0.058	0.06	6.62	0.00	
30	10.09	0.00	32.644	0.000	25.12	285.7	0.087	0.13	6.56	0.00	
50	10.00	0.00	32.655	0.000	25.14	283.9	0.145	0.37	6.45	0.00	
75	9.88	0.00	33.330	0.003	25.69	232.5	0.210	0.78	4.87	0.00	0.94
100	9.30	0.00	33.562	0.001	25.97	206.8	0.265	1.27	3.97	0.01	0.94
150	8.38	0.00	33.891	0.000	26.37	169.3	0.360	2.46	2.66	0.01	1.04

BROWN BEAR CRUISE 320 STATION 026 OBSERVED VALUES
 DATE 6/04/63 HR 02-2 LAT 45-38 N LONG 127-41 W SNG 2834 WEA 03 WIND VEL 10 DIR 20
 BAROM 03-0 TEMP DRY 10-6 WET 9-0 RELHU 82 WTRCLR SEA 2 DIR 20 SWELL 2 DIR 21
 CLOUD TYPE 3 AMT 8 VIS 6 WIRE ANGLE(S) 17, 6

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
2	0	9.78	32.547	25.10	6.63	0.592	-0.033		106
2	5	9.75	32.547	25.10	6.68	0.597	-0.037		107
2	10	9.70	32.544	25.11	6.62	0.591	-0.031		106
2	20	9.70	32.555	25.12	6.62	0.591	-0.031		106
2	30	9.64	32.568	25.14	6.50	0.581	-0.020		104
2	50	9.60	32.568	25.14	6.50	0.581	-0.019		103
2	74	8.40	33.051	25.71	5.08	0.454	0.121		79
2	99	8.24	33.566	26.13	3.61	0.322	0.253		56
2	124	8.03	33.827	26.37	2.92	0.261	0.316		45
2	153	7.67	33.888	26.47	2.69	0.240	0.341		41
1	172	7.45	33.944	26.55	2.51	0.224	0.360		38
2	174	7.40	33.926	26.54	2.59	0.231	0.354		40
1	276	6.32	34.008	26.75	1.89	0.169	0.431		28
1	466	5.10	34.108	26.98	0.96	0.086	0.532		14
1	706	4.26	34.276	27.21	0.44	0.039	0.591		6
1	948	3.58	34.409	27.38	0.38	0.034	0.607		5
1	1432	2.76	34.507	27.54	0.75	0.067	0.587		10
1	1728	2.18	34.558	27.63	1.22	0.109	0.555		16

BROWN BEAR CRUISE 320 STATION 026 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.54	0.34		32.595
6	0.56	0.50		32.552
20	0.61	0.48		32.546
42	0.57	0.23		32.566

24.51 17.21 - WATER COLUMN VALUES

MESSANGER TIME 1950 INCOMING SOLAR RADIATION - AM 134 PM 156

BROWN BEAR				CRUISE 320			STATION 026		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	9.78	0.00	32.547	0.000	25.10	287.5	0.000	0.00	6.63	0.00				
10	9.70	0.00	32.544	0.000	25.11	286.6	0.029	0.02	6.62	0.00				
20	9.70	0.00	32.555	0.000	25.12	286.0	0.058	0.06	6.62	0.00				
30	9.64	0.00	32.568	0.000	25.14	284.3	0.087	0.13	6.50	0.00				
50	9.60	0.00	32.568	0.000	25.14	284.0	0.144	0.37	6.50	0.00				
75	8.38	0.01	33.074	0.002	25.73	228.7	0.209	0.77	5.01	0.00	0.94			
100	8.23	0.00	33.581	0.000	26.15	189.3	0.261	1.24	3.57	0.00	0.94			
150	7.71	0.00	33.887	0.004	26.46	160.0	0.349	2.35	2.70	0.01	0.91			
200	7.11	0.01	33.975	0.018	26.62	146.0	0.427	3.73	2.34	0.04	1.81			
250	6.58	0.01	34.010	0.014	26.72	137.0	0.498	5.37	2.02	0.02	1.24			
300	6.12	0.01	34.022	0.002	26.79	131.0	0.566	7.28	1.75	0.00	0.93			
400	5.44	0.02	34.075	0.004	26.91	119.6	0.692	11.80	1.23	0.00	0.73			
500	4.95	0.01	34.131	0.002	27.01	110.7	0.808	17.15	0.85	0.01	0.85			
600	4.57	0.03	34.201	0.003	27.11	102.1	0.916	23.21	0.60	0.01	0.67			
700	4.28	0.00	34.272	0.000	27.20	94.3	1.015	29.83	0.45	0.00	0.96			
800	3.98	0.00	34.333	0.001	27.28	87.2	1.107	36.89	0.38	0.01	0.63			
1000	3.48	0.01	34.425	0.003	27.40	76.2	1.272	52.09	0.39	0.00	0.95			
1200	3.12	0.04	34.475	0.009	27.48	69.8	1.420	68.78	0.50	0.01	0.88			
1500	2.65	0.01	34.516	0.002	27.55	63.2	1.622	96.78	0.84	0.00	0.96			

DATE 6/04/63 HR 09.3 LAT 45-51 N LONG 127-13 W WEA 21 WIND VEL 0 DIR 00
 BAROM 02.0 TEMP DRY 9.0 WET 7.6 RELHU 82 WTRCLR SECDI SEA 0 DIR 00 SWELL 1 DIR 24
 CLOUD TYPE 7 AMT 9 VIS 5 WIRE ANGLE(S) 5

BROWN BEAR CRUISE 320 STATION 027 OBSERVED VALUES									
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	9.70	32.474	25.05	6.62	0.591	-0.031		106
1	5	9.74	32.506	25.07	6.68	0.597	-0.037		107
1	10	9.74	32.528	25.09	6.69	0.598	-0.038		107
1	20	9.70	32.539	25.10	6.65	0.594	-0.034		106
1	30	9.69	32.546	25.11	6.60	0.589	-0.029		105
1	50	9.68	32.535	25.10	6.56	0.586	-0.026		105
1	74	8.44	33.020	25.68	5.12	0.457	0.117		80
1	99	8.24	33.579	26.14	3.47	0.310	0.265		54
1	124	8.05	33.774	26.33	2.88	0.257	0.319		45
1	149	7.82	33.859	26.43	2.56	0.229	0.351		39
1	170	7.53	33.920	26.52	2.36	0.211	0.372		36

BROWN BEAR CRUISE 320 STATION 027 BIOLOGICAL DATA
 INCOMING SOLAR RADIATION - AM 330 PM 302
 ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0012-0022 DEPTHS 100, 70
 0039-0049 35, 0

DEPTH	BROWN BEAR		CRUISE 320		STATION 027		INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEO POT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	9.70	0.00	32.474	0.000	25.05	291.6	0.000	0.00	6.62	0.00		
10	9.74	0.00	32.528	0.000	25.09	288.4	0.030	0.02	6.69	0.00		
20	9.70	0.00	32.539	0.000	25.10	287.2	0.059	0.06	6.65	0.00		
30	9.69	0.00	32.546	0.000	25.11	286.7	0.088	0.13	6.60	0.00		
50	9.68	0.00	32.535	0.000	25.10	287.7	0.145	0.37	6.56	0.00	0.94	
75	8.42	0.01	33.045	0.003	25.70	231.4	0.211	0.78	5.05	0.01	0.94	
100	8.23	0.00	33.591	0.002	26.16	188.6	0.264	1.25	3.43	0.01	0.94	
150	7.81	0.00	33.862	0.000	26.43	163.3	0.352	2.37	2.55	0.00	1.02	

BROWN BEAR CRUISE 320 STATION 028 OBSERVED VALUES									
DATE 6/04/63	HR 15.8	LAT 46-15 N	LONG 126-24 W	WEA 04	WIND VEL 20 DIR 24	SEA 2	DIR 24	SWELL 1	DIR 21
BAROM 02.0	TEMP DRY 10.7	WET 8.8	RELHU 80	WTRCLR					
CLOUD TYPE 1	AMT 7	VIS 7	WIRE ANGLE(S) 20, 8						
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	ADU	SATN	
2	0	9.56	32.495	25.09	6.62	0.591	-0.029	105	
2	5	9.54							
2	10	9.52	32.502	25.10	6.64	0.593	-0.031	105	
2	20	9.53	32.509	25.11	6.65	0.594	-0.032	106	
2	30	9.43	32.524	25.14	6.57	0.587	-0.023	104	
2	50	9.42	32.513	25.13	6.55	0.585	-0.021	104	
2	74	9.40	32.524	25.14	6.56	0.586	-0.022	104	
2	99	8.30	32.840	25.56	5.70	0.509	0.068	88	
2	124	7.64	33.262	25.98	4.83	0.431	0.153	74	
2	148	7.85	33.692	26.29	3.60	0.322	0.258	55	
2	173	7.30	33.870	26.51	3.08	0.275	0.312	47	
1	189	7.30	33.917	26.55	2.83	0.253	0.334	43	
1	284	6.17	33.966	26.74	2.22	0.198	0.404	33	
1	475	5.01	34.073	26.96	0.97	0.087	0.533	14	
1	714	4.17	34.252	27.20	0.27	0.024	0.608	4	
1	953	3.67	34.386	27.35	0.24	0.021	0.618	3	
1	1433	2.80	34.505	27.53	0.63	0.056	0.597	9	
1	1725	2.17	34.561	27.63	1.10	0.098	0.566	15	

BROWN BEAR CRUISE 320 STATION 028 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	SAL DECK-I
0			32.296
6	0.70	1.25	32.480
20	0.74	1.00	32.480
42	0.75	0.91	32.487

22.48 44.26 - WATER COLUMN VALUES

MESSANGER TIME 0719 INCOMING SOLAR RADIATION - AM 330 PM 302

BROWN BEAR				CRUISE 320			STATION 028		INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0 10 20 30	9.56	0.00	32.495	0.000	25.09	287.9	0.000	0.00	6.62	0.00			
	9.52	0.00	32.502	0.000	25.10	287.0	0.029	0.02	6.64	0.00			
	9.53	0.00	32.509	0.000	25.11	286.8	0.058	0.06	6.65	0.00			
	9.43	0.00	32.524	0.000	25.14	284.3	0.087	0.13	6.57	0.00			
50 75 100 150	9.42	0.00	32.513	0.000	25.13	285.3	0.144	0.37	6.55	0.00			
	9.36	0.01	32.533	0.001	25.15	283.4	0.216	0.83	6.53	0.01	0.94		
	8.26	0.00	32.856	0.001	25.58	243.6	0.283	1.42	5.67	0.00	0.94		
	7.81	0.02	33.714	0.002	26.31	174.2	0.388	2.73	3.54	0.01	0.89		
200 250 300 400	7.21	0.04	33.933	0.007	26.57	150.5	0.470	4.18	2.72	0.03	1.45		
	6.66	0.09	33.971	0.015	26.68	141.1	0.543	5.87	2.35	0.06	1.71		
	6.04	0.01	33.974	0.000	26.76	133.4	0.612	7.83	2.10	0.01	0.96		
	5.35	0.04	34.028	0.001	26.89	122.1	0.741	12.43	1.43	0.03	0.75		
500 600 700 800	4.90	0.01	34.092	0.001	26.99	113.1	0.860	17.90	0.86	0.00	0.88		
	4.51	0.01	34.166	0.004	27.09	103.9	0.969	24.07	0.50	0.01	0.67		
	4.21	0.00	34.241	0.001	27.18	95.8	1.070	30.80	0.29	0.00	0.92		
	3.97	0.01	34.306	0.000	27.26	89.1	1.164	37.99	0.21	0.02	0.65		
1000 1200 1500	3.59	0.01	34.403	0.002	27.38	79.1	1.334	53.66	0.25	0.00	0.95		
	3.22	0.02	34.462	0.007	27.46	72.0	1.487	70.93	0.37	0.01	0.88		
	2.67	0.00	34.516	0.002	27.55	63.4	1.693	99.39	0.72	0.00	0.96		

BROWN BEAR CRUISE 320 STATION 28A BIOLOGICAL DATA

DATE 6/04/63 LAT 46-12 N LONG 126-28 W

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 0.39 0.37 2.26

MESSENGER TIME 0558 INCOMING SOLAR RADIATION - AM 330 PM 302

BROWN BEAR CRUISE 320 STATION 029 OBSERVED VALUES									
DATE	6/04/63	HR	20.6	LAT	46-14 N	LONG	125-50 W	SEA	01
BAROM	06.4	TEMP	DRY	10.0	WET	8.8	RELHU	77	WTRCLR
CLOUD	TYPE 8	AMT	2	VIS	8	WIRE ANGLE(S)	30,10,12 <th>SECDI</th> <td>WIND VEL 20 DIR 24</td>	SECDI	WIND VEL 20 DIR 24
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN	SWELL 3 DIR 24
2	0	9.61	32.316	24.94	6.65	0.594	-0.032	106	
2	5	9.59	32.313	24.95	6.69	0.598	-0.035	106	
2	10	9.54	32.314	24.95	6.68	0.597	-0.034	106	
2	20	9.52	32.320	24.96	6.65	0.594	-0.031	105	
2	30	9.48	32.408	25.04	6.62	0.591	-0.028	105	
2	50	9.40	32.419	25.06	6.51	0.581	-0.017	103	
2	74	9.37	32.565	25.18	6.15	0.549	0.015	97	
2	99	8.35	33.205	25.84	4.51	0.403	0.172	70	
2	124	8.01	33.527	26.14	3.70	0.330	0.248	57	
2	149	7.57	33.807	26.42	3.04	0.272	0.312	47	
2	174	7.33	33.881	26.51	2.83	0.253	0.333	43	
3	194	7.02	33.937	26.60	2.45	0.219	0.371	37	
3	292	6.00	33.992	26.78	1.83	0.163	0.441	27	
3	489	4.93	34.113	27.00	0.72	0.064	0.556	10	
3	735	4.17	34.284	27.22	0.30	0.027	0.605	4	
3	980	3.45	34.391	27.38	0.27	0.024	0.619	4	
3	1475	2.53	34.510	27.56	0.69	0.062	0.596	9	
1	1676	2.24	34.550	27.61	0.97	0.087	0.576	13	
3	1776	2.10	34.579	27.65	1.17	0.104	0.560	16	
1	1842	2.04	34.578	27.65	1.31	0.117	0.549	18	
1	2062	1.79	34.606	27.69	1.48	0.132	0.538	20	
1	2186	1.74	34.628	27.72	1.83	0.163	0.508	24	

BROWN BEAR				STATION 029		BIOLOGICAL DATA			
DEPTH	CHL-A	PRODUCTIVITY LAB-I	CRUISE 320 DECK-I	LIGHT PROD	SAT FILT	SAL	PHOS	NITR	SIL
0	0.98	1.95	14.78	2.21 2.06 1.87 1.23	100 77 59 32	32.316	0.56	1.8	7
				0.90 0.04	21 4				
6	1.02	1.63	14.66			32.311	0.56	1.0	5
20	1.03	1.66	3.80			32.319	0.58	1.2	6
42	1.12	1.05	0.46			32.311	0.61	1.5	6

43.90 63.57 264.40 - WATER COLUMN VALUES

MESSENGER TIME 1151 INCOMING SOLAR RADIATION - AM 330 PM 302
 LIGHT SATURATION INCUBATOR ILLUMINATION 18000

DEPTH	BROWN BEAR		CRUISE 320		STATION 029		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	9.61	0.00	32.316	0.000	24.94	302.0	0.000	0.00	6.65	0.00	0.94 0.94 0.94	
10	9.54	0.00	32.314	0.000	24.95	301.2	0.031	0.02	6.68	0.00		
20	9.52	0.00	32.320	0.000	24.96	300.6	0.061	0.06	6.65	0.00		
30	9.48	0.00	32.408	0.000	25.04	293.7	0.091	0.14	6.62	0.00		
50	9.40	0.00	32.419	0.000	25.06	292.0	0.150	0.38	6.51	0.00	0.94 0.94 0.94	
75	9.33	0.01	32.589	0.005	25.20	278.8	0.222	0.84	6.09	0.01		
100	8.33	0.00	33.221	0.002	25.85	217.4	0.284	1.39	4.47	0.00		
150	7.56	0.00	33.812	0.001	26.43	163.4	0.380	2.59	3.03	0.00		
200	6.94	0.00	33.946	0.004	26.62	145.9	0.458	3.98	2.38	0.02	1.16	
250	6.37	0.02	33.991	0.015	26.73	135.7	0.529	5.61	1.97	0.08	1.51	
300	5.94	0.01	33.997	0.000	26.79	130.5	0.597	7.51	1.78	0.00	0.98	
400	5.31	0.04	34.057	0.000	26.91	119.4	0.723	12.01	1.17	0.02	0.77	
500	4.89	0.00	34.121	0.001	27.01	110.7	0.839	17.36	0.69	0.00	0.95	
600	4.55	0.02	34.193	0.004	27.11	102.4	0.946	23.43	0.44	0.03	0.68	
700	4.26	0.01	34.261	0.002	27.19	94.9	1.046	30.07	0.32	0.01	0.82	
800	3.97	0.00	34.317	0.001	27.27	88.3	1.139	37.20	0.27	0.01	0.71	
1000	3.40	0.00	34.396	0.001	27.39	77.5	1.306	52.62	0.27	0.00	1.01	
1200	2.98	0.02	34.452	0.005	27.47	69.9	1.456	69.45	0.39	0.01	0.89	
1500	2.50	0.01	34.509	0.004	27.56	61.9	1.656	97.14	0.70	0.01	1.73	
2000	1.85	0.01	34.595	0.001	27.68	50.2	1.941	147.79	1.43	0.03	1.06	

BROWN BEAR CRUISE 320 STATION 030 OBSERVED VALUES
 DATE 7/04/63 HR 04.4 LAT 46-14 N LONG 124-55 W WEA 02 WIND VEL 4 DIR 20
 BAROM 06.1 TEMP DRY 12.8 WET 9.9 RELHU 70 WTRCLR SECDI 777
 CLOUD TYPE 0 AMT 1 VIS 8 WIRE ANGLE(S) 4 SEA 0 DIR 20 SWELL 2 DIR 22

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.89	31.857	24.54	6.62	0.591	-0.031		106
1	5	9.95	31.857	24.53	6.63	0.592	-0.033		106
1	10	9.83	31.861	24.55	6.62	0.591	-0.030		105
1	20	9.83	31.858	24.55	6.57	0.587	-0.026		105
1	30	9.56	32.017	24.72	6.43	0.574	-0.010		102
1	50	9.47	32.354	25.00	6.29	0.562	0.002		100
1	74	9.36	32.582	25.19	5.96	0.532	0.032		94
1	99	9.27	33.262	25.74	4.50	0.402	0.161		71
1	124	8.71	33.638	26.12	3.51	0.313	0.255		55
1	149	7.84	33.768	26.35	3.15	0.281	0.298		49
1	174	7.63	33.854	26.45	2.89	0.258	0.324		44
1	198	7.33	33.903	26.53	2.68	0.239	0.347		41
1	297	6.23	33.969	26.73	1.99	0.178	0.424		30
1	496	5.09	34.101	26.97	0.76	0.068	0.550		11
1	759	4.05	34.315	27.26	0.30	0.027	0.607		4

BROWN BEAR CRUISE 320 STATION 030 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.81	0.67	31.853
2	0.98	1.02	31.853
9	1.06	1.13	31.852
24	1.19	1.19	31.862

25.80 26.65 - WATER COLUMN VALUES

MESSENGER TIME 1950 INCOMING SOLAR RADIATION - AM 330 PM 302

BROWN BEAR			CRUISE 320			STATION 030			INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	9.89	0.00	31.857	0.000	24.54	340.3	0.000	0.00	6.62	0.00				
10	9.83	0.00	31.861	0.000	24.55	339.3	0.035	0.02	6.62	0.00				
20	9.83	0.00	31.858	0.000	24.55	339.7	0.069	0.07	6.57	0.00				
30	9.56	0.00	32.017	0.000	24.72	323.9	0.102	0.16	6.43	0.00				
50	9.47	0.00	32.354	0.000	25.00	297.9	0.165	0.41	6.29	0.00				
75	9.36	0.00	32.608	0.005	25.21	277.8	0.237	0.87	5.91	0.01	0.94			
100	9.26	0.00	33.282	0.000	25.76	226.7	0.301	1.44	4.45	0.00	0.94			
150	7.83	0.00	33.772	0.000	26.36	170.1	0.401	2.68	3.14	0.00	0.94			
200	7.30	0.00	33.905	0.001	26.54	153.8	0.483	4.14	2.66	0.00	1.04			
250	6.72	0.01	33.951	0.009	26.65	143.2	0.557	5.86	2.30	0.01	1.31			
300	6.21	0.00	33.971	0.000	26.74	135.8	0.628	7.85	1.97	0.00	0.99			
400	5.53	0.05	34.036	0.001	26.87	123.7	0.759	12.52	1.29	0.02	0.77			
500	5.08	0.00	34.104	0.000	26.98	114.2	0.879	18.06	0.74	0.00	13.62			
600	4.74	0.04	34.177	0.001	27.07	105.8	0.950	24.32	0.36	0.02	19.85			
700	4.36	0.04	34.260	0.001	27.18	96.1	1.092	31.12	0.23	0.02	16.98			

BROWN BEAR CRUISE 320 STATION 031 OBSERVED VALUES

COLUMBIA RIVER ENTRANCE

DATE 7/04/63 HR 10.9 LAT 46-13 N LONG 124-12 W SNDC 37 MEA 53 WIND VEL 20 DIR 09
 BAROM 98.0 TEMP DRY 9.4 WET 7.5 RELHU 76 WTRCLR SECDI SEA 2 DIR 09 SWELL 1 DIR 24
 CLOUD TYPE 9 AMT 7 VIS 8 WIRE ANGLE(S) 25

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	9.89	27.251	20.96	6.65	0.594	-0.016	103
1	5	9.90	29.649	22.82	6.45	0.576	-0.007	101
1	9	9.87	31.040	23.91	6.50	0.581	-0.017	103
1	14	9.86	31.262	24.08	6.31	0.564	-0.001	100
1	18	9.76	31.437	24.24	6.29	0.562	0.002	100
1	23	9.70	31.508	24.30	6.19	0.553	0.011	98
1	27	9.73	31.756	24.49	6.29	0.562	0.001	100

BROWN BEAR CRUISE 320 STATION 031 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	1.08	3.79		26.566
2	1.23	3.36		27.039
6	0.69	1.83		30.381
10	0.60	1.40		31.231

8.73 24.01 - WATER COLUMN VALUES

MESSENGER TIME 0245 INCOMING SOLAR RADIATION - AM 134 PM 182

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0022-0032 DEPTHS 75, 50
0050-0100 35, 0

BROWN BEAR CRUISE 320 STATION 031				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.89	0.00	27.251	0.000	20.96	682.6	0.000	0.00	6.65	0.00	
10	9.87	0.00	31.152	0.045	24.00	392.5	0.055	0.02	6.47	0.01	0.80
20	9.73	0.00	31.459	0.017	24.26	367.6	0.093	0.08	6.24	0.01	0.71

BROWN BEAR CRUISE 320 STATION 032 OBSERVED VALUES

GRAYLAND

DATE 7/04/63 HR 16.0 LAT 46-52 N LONG 124-14 W SNOG 33 WEA 03 WIND VEL 36 DIR 17
 BAROM 93.9 TEMP DRY 11.2 WET 8.7 RELHU 73 WTRCLR SECDI SEA 3 DIR 17 SWELL 6 DIR 16
 CLOUD TYPE 8 AMT 8 VIS 6 WIRE ANGLE(S) 30

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.68	27.134	20.90	6.62	0.591	-0.010	102	102
1	4	9.70	27.149	20.91	6.62	0.591	-0.010	102	102
1	9	9.67	28.573	22.02	6.57	0.587	-0.011	102	102
1	13	9.66	30.986	23.90	6.52	0.582	-0.016	103	103
1	17	9.58	31.363	24.21	6.43	0.574	-0.008	101	101
1	22	9.50	31.555	24.37	6.36	0.568	-0.002	100	100
1	26	9.47	31.746	24.52	6.07	0.542	0.024	96	96

BROWN BEAR CRUISE 320 STATION 032				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.68	0.00	27.134	0.000	20.90	688.3	0.000	0.00	6.62	0.00	0.70
10	9.67	0.00	29.219	0.099	22.52	533.0	0.062	0.03	6.56	0.00	0.71
20	9.53	0.00	31.494	0.014	24.32	362.0	0.107	0.09	6.40	0.01	0.71

BROWN BEAR CRUISE 320 STATION 32A BIOLOGICAL DATA

DATE 7/04/63 LAT 46-43 N LONG 124-34 W

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	SAL
0	0.68	2.15	10.60	1.93	100	31.167
				2.38	77	
				1.96	59	
				1.27	32	
				0.90	21	
				0.07	4	

MESSENGER TIME 1210 INCOMING SOLAR RADIATION - AM 134 PM 182
 LIGHT SATURATION INCUBATOR ILLUMINATION 17100

BROWN BEAR CRUISE 320 STATION 033

OBSERVED VALUES					
DATE	8/04/63	HR	01.5	LAT	46-51 N
BAROM	00.0	TEMP	DRY 9.1	WET 7.8	LONG 125-10 W
CLOUD	TYPE 8	AMT	6	VIS	6
				RELHU	77
				WIRE ANGLE(S)	18
				SNDG	744
				SEA	4
				DIR	19
				WEA	02
				WIND VEL	30
				SWELL	8
				DIR	19

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	— — —	MGA/L	OXYGEN	— — —	— — —
								AOU		SATN
1	0	9.42	32.207	24.89	6.46		0.577	-0.012		102
1	5	9.38	32.204	24.89	6.46		0.577	-0.012		102
1	10	9.37	32.209	24.90	6.51		0.581	-0.016		103
1	19	9.38	32.209	24.90	6.50		0.581	-0.015		103
1	29	9.36	32.234	24.92	6.43		0.574	-0.009		102
1	48	9.16	32.422	25.10	5.99		0.535	0.032		94
1	71		32.833		5.25		0.469			
1	95	8.14	33.078	25.77	4.09		0.365	0.213		63
1	119	8.17	33.707	26.26	3.15		0.281	0.294		49
1	143	7.86	33.800	26.37	2.88		0.257	0.322		44
1	180	7.60	33.862	26.46	2.79		0.249	0.333		43
1	197	7.37	33.900	26.52	2.69		0.240	0.345		41
1	249	6.23	33.995	26.75	1.79		0.160	0.442		27
1	476	5.18	34.080	26.95	0.88		0.079	0.538		13
1	666	4.39	34.227	27.15	0.11		0.010	0.619		2

BROWN BEAR CRUISE 320 STATION 033

DEPTH	CHL-A	PRODUCTIVITY LAB-I	SAL	BIOLOGICAL DATA
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37.57 33.29 - WATER COLUMN VALUES
MESSENGER TIME 1802 INCOMING SOLAR RADIATION - AM 134 PM 182

DEPTH	BROWN BEAR		CRUISE 320		STATION 033		INTERPOLATED AND COMPUTED VALUES							VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)				
0	9.42	0.00	32.207	0.000	24.89	307.1	0.000	0.00	6.46	0.00	0.88 0.98			
10	9.37	0.00	32.209	0.000	24.90	306.4	0.031	0.02	6.51	0.00				
20	9.38	0.00	32.210	0.000	24.90	306.7	0.062	0.06	6.50	0.00				
30	9.35	0.00	32.240	0.000	24.93	304.2	0.093	0.14	6.41	0.00				
50	9.11	0.01	32.457	0.005	25.13	284.7	0.152	0.38	5.94	0.00	1.00 1.02 0.76 0.88			
75	8.53	0.09	32.867	0.013	25.54	246.2	0.219	0.81	5.06	0.01				
100	8.14	0.02	33.215	0.025	25.87	215.2	0.277	1.32	3.86	0.01				
150	7.81	0.02	33.814	0.003	26.39	166.8	0.374	2.53	2.85	0.01				
200	7.31	0.01	33.906	0.000	26.54	153.8	0.454	3.97	2.65	0.01	1.05 1.01 1.39 1.24			
250	6.22	0.00	33.996	0.000	26.75	133.4	0.527	5.63	1.78	0.00				
300	5.71	0.18	34.033	0.018	26.85	124.9	0.592	7.47	1.37	0.14				
400	5.17	0.23	34.076	0.024	26.95	116.3	0.714	11.82	0.91	0.18				
500	4.32	0.50	34.082	0.004	27.04	107.1	0.826	17.02	0.19	0.39	50.91 34.90			
600	5.03	0.12	34.130	0.013	27.00	112.8	0.937	23.31	0.67	0.10				

BROWN BEAR CRUISE 320 STATION 034 OBSERVED VALUES									
DATE	8/04/63	HR	09.7	LAT	46-51 N	LONG	125-58 W	WEA	21
BAROM	01.0	TEMP	DRY	8.9	WET	7.2	RELHU	83	WTRCLR
CLOUD	TYPE	8	AMT	9	VIS	6	WIRE	ANGLE(S)	21, 5
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
2	0	9.50	32.314	24.96	6.60	0.589	-0.026		105
2	5	9.49	32.318	24.97	6.66	0.595	-0.031		106
2	10	9.46	32.313	24.97	6.73	0.601	-0.037		107
2	20	9.48	32.314	24.96	6.61	0.590	-0.027		105
2	30	9.48	32.334	24.98	6.61	0.590	-0.027		105
2	50	9.23	32.448	25.11	6.26	0.559	0.007		99
2	74	9.20	32.672	25.29	5.69	0.508	0.058		90
2	99	8.35	33.346	25.95	4.05	0.362	0.213		63
2	124	7.92	33.635	26.24	3.52	0.314	0.265		54
2	148	7.96	33.822	26.38	2.80	0.250	0.328		43
2	173	7.64	33.885	26.47	2.64	0.236	0.346		41
1	187	7.49	33.905	26.51	2.58	0.230	0.353		39
1	280	6.17	33.990	26.76	1.89	0.169	0.434		28
1	470	5.07	34.095	26.97	0.81	0.072	0.546		12
1	708	4.17	34.247	27.19	0.31	0.028	0.604		4
1	947	3.65	34.368	27.34	0.25	0.022	0.617		-
1	1429	2.67	34.495	27.53	0.55	0.049	0.606		7
1	1720	2.18	34.549	27.62	1.05	0.094	0.570		14

WIND VEL 18 DIR 13
SEA 3 DIR 13 SWELL 5 DIR 12

BROWN BEAR CRUISE 320 STATION 034 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	1.37	1.29		32.314
4	1.37	1.41		32.311
11	1.50	1.42		32.311
30	1.38	1.26		32.327

42.88 40.67 - WATER COLUMN VALUES

MESSANGER TIME 0113 INCOMING SOLAR RADIATION - AM 244 PM 175

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0028-0038 DEPTHS 100, 70 35, 0
0054-0104

BROWN BEAR			CRUISE 320			STATION 034			INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	9.50	0.00	32.314	0.000	24.96	300.4	0.000	0.00	6.60	0.00					
10	9.46	0.00	32.313	0.000	24.97	300.1	0.031	0.02	6.73	0.00					
20	9.48	0.00	32.314	0.000	24.96	300.5	0.061	0.06	6.61	0.00					
30	9.48	0.00	32.334	0.000	24.98	299.2	0.091	0.14	6.61	0.00					
50	9.23	0.00	32.448	0.000	25.11	287.2	0.150	0.38	6.26	0.00					
75	9.17	0.01	32.698	0.005	25.31	268.2	0.220	0.83	5.62	0.01	0.94				
100	8.32	0.00	33.362	0.002	25.96	206.9	0.280	1.36	4.02	0.01	0.94				
150	7.94	0.01	33.830	0.001	26.39	167.4	0.374	2.54	2.77	0.01	0.89				
200	7.31	0.02	33.920	0.001	26.55	152.7	0.455	3.98	2.50	0.01	1.67				
250	6.60	0.04	33.968	0.002	26.68	140.3	0.529	5.68	2.13	0.02	1.83				
300	6.00	0.03	34.003	0.002	26.79	130.7	0.597	7.61	1.75	0.00	0.96				
400	5.33	0.07	34.061	0.004	26.91	119.4	0.723	12.12	1.15	0.01	0.75				
500	4.93	0.00	34.114	0.001	27.00	111.7	0.840	17.49	0.71	0.01	0.86				
600	4.52	0.01	34.179	0.002	27.10	103.1	0.949	23.61	0.45	0.02	0.67				
700	4.19	0.00	34.242	0.000	27.19	95.5	1.049	30.30	0.32	0.00	0.95				
800	3.95	0.01	34.298	0.000	27.26	89.4	1.143	37.50	0.25	0.01	0.63				
1000	3.53	0.00	34.387	0.002	27.37	79.7	1.314	53.25	0.25	0.00	0.95				
1200	3.15	0.00	34.447	0.005	27.49	71.8	1.467	70.55	0.33	0.00	0.89				
1500	2.54	0.00	34.508	0.001	27.55	62.5	1.671	98.75	0.65	0.00	10.50				

BROWN BEAR CRUISE 320 STATION 34A BIOLOGICAL DATA

DATE 8/04/63 LAT 46-51 N LONG 126-35 W

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	1.10	2.08	14.74
			32.257

MESSENGER TIME 0548 INCOMING SOLAR RADIATION - AM 244 PM 175

BROWN BEAR CRUISE 320 STATION 035 OBSERVED VALUES

DATE 8/04/63 HR 15.0 LAT 46-50 N LONG 126-44 W WEA 02 WIND VEL 10 DIR 36
 BAROM 03.0 TEMP DRY 10.3 WET 8.9 RELHU 84 WTRCLR SEA 2 DIR 36 SWELL 4 DIR 32
 CLOUD TYPE 4 AMT 6 VIS 7 WIRE ANGLE(S) 2,10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
2	0	9.67	32.510	25.09	6.50	0.581	-0.020	1.04	104
2	5	9.67	32.505	25.08	6.57	0.587	-0.026	1.05	105
2	10	9.61	32.511	25.10	6.57	0.587	-0.025	1.05	105
2	20	9.63	32.507	25.09	6.55	0.585	-0.024	1.04	104
2	30	9.64	32.503	25.09	6.54	0.584	-0.023	1.04	104
2	50	9.57	32.528	25.12	6.53	0.583	-0.021	1.04	104
2	74	9.49	32.531	25.13	6.46	0.577	-0.014	1.03	103
2	99	7.97	32.920	25.67	5.53	0.494	0.087	85	85
2	122	7.30			5.20	0.464			
2	153	7.45	33.204	25.97	4.12	0.368	0.219	63	63
2	175	7.05	33.623	26.35	3.85	0.344	0.247	58	58
1	195	6.95	33.823	26.52	3.58	0.320	0.272	54	54
1	293	5.78	33.932	26.76	2.45	0.219	0.390	36	36
1	490	4.53	34.064	27.01	0.95	0.085	0.542	14	14
1	736	3.91	34.253	27.22	0.47	0.042	0.594	7	7
1	982	3.43	34.384	27.38	0.38	0.034	0.609	5	5
1	1477	2.59	34.512	27.55	0.77	0.069	0.588	10	10
1	1776	2.10	34.554	27.63	1.20	0.107	0.558	16	16

BROWN BEAR CRUISE 320 STATION 035				BIOLOGICAL DATA
DEPTH	CHL-A	PRODUCTIVITY LAB-I DECK-I	SAL	
0	0.46	0.54	32.507	
8	0.37	0.57	32.502	
29	0.47	0.60	32.502	
47	0.45	0.44	32.509	
100	0.11	0.08	32.736	
20.54 26.10 - WATER COLUMN VALUES				
MESSENGER TIME 0753 INCOMING SOLAR RADIATION - AM 244 PM 175				

DEPTH	BROWN BEAR		CRUISE 320		STATION 035		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)		
0	9.67	0.00	32.510	0.000	25.09	288.5	0.000	0.00	6.50	0.00		
10	9.61	0.00	32.511	0.000	25.10	287.7	0.030	0.02	6.57	0.00		
20	9.63	0.00	32.507	0.000	25.09	288.5	0.059	0.06	6.55	0.00		
30	9.64	0.00	32.503	0.000	25.09	289.1	0.088	0.13	6.54	0.00		
50	9.57	0.00	32.528	0.000	25.12	286.5	0.146	0.37	6.53	0.00		
75	9.44	0.01	32.544	0.004	25.15	283.7	0.217	0.83	6.43	0.01	0.95	
100	7.93	0.00	32.924	0.006	25.68	233.8	0.283	1.41	5.51	0.01	0.99	
150	7.43	0.03	33.184	0.016	25.95	208.3	0.394	2.82	4.22	0.02	0.99	
200	6.90	0.01	33.846	0.011	26.55	152.7	0.485	4.42	3.52	0.00	1.13	
250	6.34	0.06	33.975	0.058	26.72	136.5	0.558	6.10	2.91	0.00	1.52	
300	5.72	0.00	33.938	0.001	26.77	132.1	0.626	8.01	2.38	0.00	0.98	
400	4.97	0.03	34.010	0.006	26.92	118.9	0.752	12.53	1.51	0.00	0.77	
500	4.49	0.01	34.072	0.001	27.02	109.8	0.868	17.85	0.91	0.01	0.95	
600	4.18	0.04	34.150	0.003	27.11	101.3	0.974	23.85	0.62	0.05	0.68	
700	3.96	0.02	34.226	0.002	27.20	94.1	1.073	30.43	0.48	0.02	0.82	
800	3.78	0.00	34.292	0.000	27.27	87.9	1.165	37.51	0.42	0.01	0.72	
1000	3.40	0.00	34.391	0.001	27.38	77.8	1.333	52.94	0.38	0.00	0.98	
1200	3.05	0.01	34.456	0.004	27.47	70.4	1.483	69.87	0.48	0.01	0.89	
1500	2.55	0.00	34.515	0.000	27.56	62.1	1.684	97.70	0.80	0.00	12.54	

BROWN BEAR CRUISE 320 STATION 036 OBSERVED VALUES									
DATE 8/04/63		HR 19.6	LAT 47-01 N	LONG 126-25 W	SEA 1 DIR 35	WEA 02	WIND VEL 10 DIR 35		
BAROM 05.1		TEMP DRY 9.8	WET 8.5	RELHU 85	WTRCLR	SECDI	2472		
CLOUD TYPE 8		AMT 6	VIS 8	WIRE ANGLE(S) --					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.57	32.279	24.92	6.62	0.591	-0.029		105
1	5	9.51	32.275	24.93	6.70	0.598	-0.035		106
1	10	9.37	32.291	24.96	6.69	0.598	-0.032		106
1	20	9.35	32.281	24.96	6.65	0.594	-0.028		105
1	30	9.39	32.286	24.96	6.62	0.591	-0.026		105
1	50	9.29	32.424	25.08	6.56	0.586	-0.020		104
1	74	9.20	32.635	25.26	5.91	0.528	0.038		93
1	99	8.48	33.278	25.87	4.30	0.384	0.189		67
1	124	8.01	33.578	26.18	3.65	0.326	0.252		56
1	149	7.78	33.795	26.38	3.01	0.269	0.311		46
1	176	7.58	33.890	26.48	2.69	0.240	0.342		41

BROWN BEAR CRUISE 320 STATION 036 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	1.10	2.04	16.02			50	32.283	0.57	1.1	6
6	1.00	1.64	10.16			10	32.282	0.42	0.6	8
20	1.29	1.28	2.56			1	32.280	0.48	0.6	7
38	0.54	0.42	0.00	0.30	100		32.314	0.59	1.7	6
				0.37	77					
				0.31	59					
				0.31	32					
				0.20	21					
100	0.06			0.00	4		33.362	1.74	23.7	28
150	0.03						33.840	2.09	32.0	39

38.78 46.79 190.62 - WATER COLUMN VALUES

MESSANGER TIME 1112 INCOMING SOLAR RADIATION - AM 244 PM 175

LIGHT SATURATION INCUBATOR ILLUMINATION 18700

BROWN BEAR CRUISE 320 STATION 036 INTERPOLATED AND COMPUTED VALUES											
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEO POT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.57	0.00	32.279	0.000	24.92	304.1	0.000	0.00	6.62	0.00	
10	9.37	0.00	32.291	0.000	24.96	300.3	0.031	0.02	6.69	0.00	
20	9.35	0.00	32.281	0.000	24.96	300.9	0.061	0.06	6.65	0.00	
30	9.39	0.00	32.286	0.000	24.96	301.3	0.092	0.14	6.62	0.00	
50	9.29	0.00	32.424	0.000	25.08	289.9	0.151	0.38	6.56	0.00	0.94
75	9.17	0.01	32.660	0.005	25.28	271.1	0.222	0.83	5.85	0.01	0.94
100	8.46	0.00	33.294	0.002	25.89	213.8	0.283	1.37	4.26	0.01	0.94
150	7.77	0.00	33.801	0.000	26.39	167.2	0.379	2.58	2.99	0.00	5.20

BROWN BEAR CRUISE 320 STATION 037 OBSERVED VALUES													
DATE	8/04/63	HR	22.1	LAT	47-11 N	LONG	126-06 W	SEA	2395	WIND	VEL	6 DIR	08
BAROM	05.0	TEMP	DRY	10.0	WET	8.4	RELHU	81	WTRCLR	SEA	2 DIR	08	SWELL
CLOUD	TYPE	8	VIS	8	WIRE	ANGLE(S)	2, 6, 5					1 DIR	14
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN				
2	0	9.61	32.356	24.98	6.65	0.594	0.032		106				
2	5	9.59	32.356	24.98	6.73	0.601	-0.039		107				
2	10	9.46	32.355	25.00	6.70	0.598	-0.035		106				
2	20	9.30	32.358	25.03	6.61	0.590	-0.024		104				
2	30	9.30	32.364	25.03	6.72	0.600	0.034		106				
2	50	9.23	32.456	25.11	6.45	0.576	-0.010		102				
2	74	9.03	32.651	25.30	5.84	0.521	0.047		92				
2	99	8.42	33.242	25.85	4.32	0.386	0.188		67				
2	124	7.91	33.518	26.15	3.77	0.337	0.243		58				
2	149	7.69	33.669	26.30	3.54	0.316	0.266		54				
2	176	7.48	33.836	26.46	2.99	0.267	0.317		46				
3	197	7.30	33.897	26.53	2.68	0.239	0.347		41				
3	294	6.21	33.981	26.74	2.48	0.221	0.380		37				
3	492	5.05	34.106	26.98	0.49	0.044	0.575		7				
3	738	4.19	34.267	27.21	0.44	0.039	0.592		6				
3	985	3.59	34.376	27.35	0.38	0.034	0.607		5				
3	1486	2.52	34.508	27.56	0.81	0.072	0.586		11				
1	1776	2.08	34.587	27.66	1.18	0.105	0.560		16				
3	1782	2.05	34.563	27.64	1.39	0.124	0.542		19				
1	1925	1.96	34.587	27.67	1.40	0.125	0.542		19				
1	2173	1.81	34.609	27.70	1.65	0.147	0.523		22				
1	2323	1.75	34.614	27.70	1.79	0.160	0.511		24				

DEPTH	BROWN BEAR	TEMP	E(T)	SAL	CRUISE 320		STATION 037		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
					E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)			
0		9.61	0.00	32.356	0.000	24.98	299.0	0.000	0.00	0.00	6.65	0.00		
10		9.46	0.00	32.355	0.000	25.00	296.9	0.031	0.02	0.00	6.70	0.00		
20		9.30	0.00	32.358	0.000	25.03	294.5	0.060	0.06	0.00	6.61	0.00		
30		9.30	0.00	32.364	0.000	25.03	294.2	0.090	0.14	0.00	6.72	0.00		
50		9.23	0.00	32.456	0.000	25.11	286.6	0.148	0.38	0.00	6.45	0.00	0.94	
75		9.01	0.00	32.674	0.005	25.37	267.5	0.278	0.36	0.00	5.78	0.00	0.94	
100		8.40	0.00	33.257	0.001	25.80	227.5	0.378	1.20	0.00	4.23	0.00	0.95	
150		7.68	0.00	33.676	0.001	26.30	147.1	0.378	12.37	0.00	3.52	0.00		
200		7.27	0.00	33.902	0.002	26.54	53.5	0.559	4.70	0.01	2.66	0.10	1.07	
250		6.71	0.03	33.964	0.013	26.65	42.1	0.559	5.75	0.02	2.48	0.02	1.49	
300		6.19	0.00	33.985	0.000	26.80	31.8	0.573	7.37	0.00	2.22	0.00	0.78	
400		5.47	0.04	34.052	0.003	26.89	11.1	0.573	12.37	0.16	1.94	0.00		
500		5.01	0.00	34.112	0.000	26.99	9.2	0.522	17.83	0.01	0.47	0.00	0.96	
600		4.62	0.02	34.180	0.002	27.09	104.2	0.963	24.07	0.11	0.30	0.00	0.68	
700		4.29	0.01	34.244	0.001	27.18	96.3	1.063	30.77	0.06	0.36	0.00	0.91	
800		4.02	0.01	34.298	0.001	27.25	90.3	1.15	36.04	0.01	0.42	0.00	0.72	
1000		3.55	0.00	34.381	0.001	27.36	80.4	1.331	53.93	0.00	0.39	0.00	0.98	
1200		3.09	0.01	34.440	0.005	27.45	72.1	1.485	71.34	0.02	0.50	0.00	0.91	
1500		2.49	0.00	34.511	0.000	27.56	61.7	1.689	99.41	0.01	0.84	0.00	0.91	
2000		1.91	0.00	34.596	0.000	27.68	50.8	1.974	150.29	0.01	1.46	0.00	0.86	

BROWN BEAR CRUISE 320 STATION 038 OBSERVED VALUES									
DATE 9/04/63		HR 05-2	LAT 47-33 N	LONG 125-27 W	SEA 0 DIR 15	WIND VEL 6 DIR 15			
BAROM 90.0		TEMP DRY 8.9	WET 7.5	RELHU 81	WTRCLR	SEA 0 DIR 15	WIND VEL 6 DIR 15		
CLOUD TYPE 6		AMT 6	VIS 8	WIRE ANGLE(S) 17.10					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN ADU	SECDI	SATN
2	0	9.24	32.187	24.90	6.66	0.595	-0.027	105	
2	5	9.24	32.177	24.90	6.70	0.598	-0.031	105	
2	10	9.20	32.176	24.90	6.65	0.594	-0.026	105	
2	20	9.23	32.184	24.90	6.65	0.594	-0.026	105	
2	30	9.21	32.226	24.94	6.57	0.587	-0.019	103	
2	50	9.21	32.253	24.96	6.57	0.587	-0.019	103	
2	74	8.79	32.684	25.36	5.49	0.490	0.081	86	
2	99	8.39	33.065	25.72	4.61	0.412	0.163	72	
2	124	7.87	33.678	26.28	3.11	0.278	0.302	48	
2	149	7.72	33.840	26.43	2.64	0.236	0.345	41	
2	174	7.44	33.895	26.51	2.44	0.218	0.367	37	
1	190	7.32	33.902	26.53	2.39	0.213	0.373	36	
1	285	6.45	33.966	26.70	2.11	0.188	0.410	31	
1	475	5.18	34.078	26.95	0.94	0.084	0.533	14	
1	712	4.26	34.242	27.18	0.32	0.029	0.602	5	
1	998	3.60	34.350	27.33	0.27	0.024	0.617	4	

BROWN BEAR CRUISE 320 STATION 038 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	1.19	0.82		32.175
6	1.28	1.11		32.175
20	1.39	1.04		32.176
38	1.24	1.06		32.233
100	0.12	0.07		33.017

49.85 39.81 - WATER COLUMN VALUES

MESSANGER TIME 2213 INCOMING SOLAR RADIATION - AM 305 PM 340

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 2321-2331 DEPTHS 100, 70
35, 0

BROWN BEAR			CRUISE 320			STATION 038			INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VUL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	9.24	0.00	32.187	0.000	24.90	305.9	0.000	0.00	6.66	0.00				
10	9.20	0.00	32.176	0.000	24.90	306.3	0.031	0.02	6.65	0.00				
20	9.23	0.00	32.184	0.000	24.90	306.3	0.062	0.06	6.65	0.00				
30	9.21	0.00	32.226	0.000	24.94	303.1	0.093	0.14	6.57	0.00				
50	9.21	0.00	32.253	0.000	24.96	301.4	0.154	0.39	6.57	0.00				
75	8.77	0.00	32.698	0.002	25.37	262.3	0.225	0.84	5.46	0.01	0.94			
100	8.37	0.00	33.092	0.004	25.74	227.6	0.286	1.39	4.55	0.01	0.94			
150	7.71	0.00	33.844	0.000	26.43	163.2	0.385	2.61	2.63	0.00	0.94			
200	7.23	0.01	33.908	0.001	26.55	152.6	0.465	4.04	2.36	0.00	1.41			
250	6.78	0.02	33.940	0.002	26.64	144.8	0.539	5.76	2.22	0.01	1.74			
300	6.33	0.00	33.975	0.000	26.72	137.0	0.611	7.77	2.02	0.02	0.97			
400	5.62	0.01	34.034	0.002	26.86	124.9	0.743	12.49	1.41	0.06	0.75			
500	5.06	0.01	34.096	0.001	26.97	114.6	0.864	18.05	0.84	0.01	0.88			
600	4.63	0.02	34.167	0.004	27.08	105.2	0.975	24.31	0.52	0.02	0.65			
700	4.29	0.00	34.234	0.001	27.17	97.3	1.077	31.13	0.33	0.00	0.92			
800	4.03	0.01	34.292	0.002	27.24	90.8	1.172	38.45	0.25	0.01	8.36			

BROWN BEAR CRUISE 320 STATION 039 BIOLOGICAL DATA

DATE 9/04/63 LAT 48-08 N LONG 124-50 W

DEPTH CHL-A PRODUCTIVITY LAB-I DECK-I SAL

0 0.93 2.69 26.32 32.749

MESSANGER TIME 0543 INCOMING SOLAR RADIATION - AM 305 PM 340

BROWN BEAR CRUISE 320 STATION 039 OBSERVED VALUES

TOLEAK POINT

DATE 9/04/63 HR 12-2 LAT 47-52 N LONG 124-50 W SNDC 73 WEA 60 WIND VEL 26 DIR 14
 BAROM 09.0 TEMP DRY 8.9 WET 7.2 RELHU 80 WTRCLR SECDI SEA 2 DIR 14 SWELL 1 DIR 20
 CLOUD TYPE 6 AMT 7 VIS 7 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					ML/L	MGA/L		
1	0	9.51	31.591	24.40	6.57	0.587	-0.021	104
1	5	9.49	31.604	24.41	6.57	0.587	-0.020	104
1	10	9.51	31.604	24.41	6.45	0.576	-0.010	102
1	19	9.49	31.605	24.41	6.34	0.566	0.000	100
1	29	9.50	31.610	24.41	6.38	0.570	-0.004	101
1	39	9.47	31.606	24.41	6.45	0.576	-0.009	102
1	48	9.46	31.623	24.43	6.43	0.574	-0.008	101
1	58	9.42	31.631	24.44	6.15	0.549	0.018	97
1	67	9.40	31.656	24.46	6.50	0.581	-0.013	102

BROWN BEAR		CRUISE 320		STATION 039		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.51	0.00	31.591	0.000	24.40	354.2	0.000	0.00	6.57	0.00	
10	9.51	0.00	31.604	0.000	24.41	353.4	0.036	0.02	6.45	0.00	
20	9.49	0.00	31.606	0.000	24.41	353.2	0.072	0.07	6.34	0.00	0.88
30	9.50	0.00	31.609	0.000	24.41	353.2	0.107	0.16	6.39	0.00	0.87
50	9.45	0.00	31.624	0.001	24.43	351.7	0.178	0.46	6.36	0.03	0.78

BROWN BEAR CRUISE 320 STATION 040 OBSERVED VALUES

TATOOSH ISLAND

DATE 9/04/63 HR 16.2 LAT 48-27 N LONG 124-40 W SNGD 1554 WEA 01 WIND VEL 4 DIR 90
 BAROM 12.0 TEMP DRY 11.1 WET 5.7 RELHU 67 WTRCLR SECDI SEA 0 DIR 90 SWELL 1 DIR 22
 CLOUD TYPE 6 AMT 6 VIS 7 WIRE ANGLE(S) 24,---

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		SATN	
					ML/L	MGA/L	AOU	
1	0	9.32	28.385	21.93	6.71	0.599	-0.018	103
1	5	9.30	28.481	22.01	6.71	0.599	-0.018	103
1	9	9.26	28.593	22.10	6.56	0.586	-0.005	101
1	18	9.30	29.341	22.68	6.70	0.598	-0.021	104
1	27	9.40	30.524	23.58	6.66	0.595	-0.023	104
1	46	9.39	31.693	24.49	6.44	0.575	-0.008	101
2	64	9.40	31.827	24.60	6.47	0.578	-0.011	102
2	85	9.26	32.082	24.82	6.44	0.575	-0.008	101
2	106	7.94	32.607	25.43	4.30	0.384	0.199	66
2	127	8.24	33.083	25.76	4.05	0.362	0.215	63
2	148	7.63	33.454	26.14	3.28	0.293	0.291	50
2	160	7.39	33.571	26.26	3.01	0.269	0.318	46
2	210	7.07	33.703	26.41	2.78	0.248	0.342	42

BROWN BEAR CRUISE 320 STATION 040 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	1.99	6.23		28.967
3	2.07	6.09		29.096
6	1.75	4.83		29.738
12	1.89	5.19		29.696
100	0.75	1.06		32.105

22.73 64.92 - WATER COLUMN VALUES

MESSENGER TIME 0836 INCOMING SOLAR RADIATION - AM 305 PM 340

BROWN BEAR CRUISE 320 STATION 040					INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.32	0.00	28.385	0.000	21.93	589.9	0.000	0.00	6.71	0.00	
10	9.26	0.00	28.648	0.004	22.14	569.5	0.059	0.03	6.56	0.01	0.97
20	9.32	0.00	29.603	0.024	22.88	499.5	0.113	0.11	6.70	0.00	0.75
30	9.41	0.01	30.804	0.017	23.80	411.6	0.159	0.23	6.62	0.01	0.94
50	9.40	0.00	31.760	0.030	24.55	340.8	0.234	0.53	6.44	0.01	0.74
75	9.41	0.04	31.937	0.007	24.68	328.3	0.319	1.07	6.59	0.08	0.66
100	8.29	0.10	32.446	0.011	25.25	274.5	0.395	1.74	4.92	0.14	0.70
150	7.59	0.00	33.477	0.001	26.16	188.7	0.511	3.19	3.23	0.00	0.76
200	7.06	0.00	33.691	0.010	26.40	166.4	0.601	4.78	2.75	0.01	15.97

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R&D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1 ORIGINATING ACTIVITY (Corporate author) University of Washington, Department of Oceanography, Seattle, Washington 98105		2a REPORT SECURITY CLASSIFICATION Unclassified
		2b GROUP
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4 DESCRIPTIVE NOTES (Type of report and inclusive dates) Interim Report January - June 1963		
5 AUTHOR(3) (Last name, first name, initial) Love, Cuthbert M. With the Data Analysis Staff		
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11 SUPPLEMENTARY NOTES	12 SPONSORING MILITARY ACTIVITY Office of Naval Research San Francisco California	
13 ABSTRACT This report contains tabulated physical, chemical, and biological data collected during Cruise Oshawa-1 of the CNAV Oshawa and Cruise 220 of the Research Vessel Brown Bear during the months of March - April 1963 in an area within 255 miles of the coasts of Vancouver Island, Washington, and Oregon. These data were collected as part of a year-round study which has as its objective the determination of the gross features of the move- ment and dispersion of Columbia River effluent water in the northeast Pacific.		

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1 JAN 64

Unclassified

Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Oceanographic data Physical oceanographic data Chemical oceanographic data Biological oceanographic data Oceanographic cruises Research Vessel <u>Brown Bear</u> CNAV <u>Oshawa</u> Northeast Pacific Ocean Washington - Oregon coast Columbia River Effluent water						

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